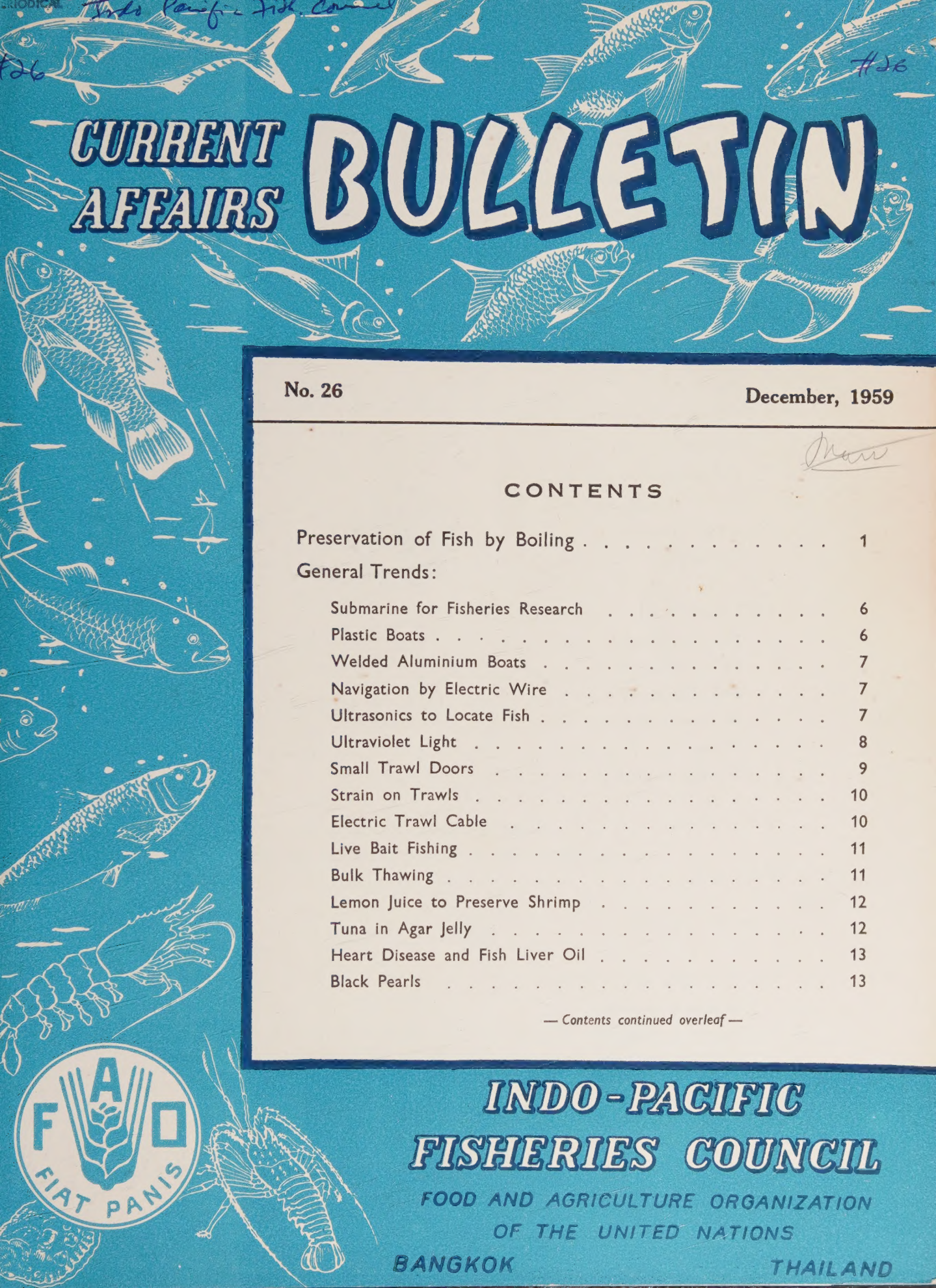




CURRENT AFFAIRS

BULLETIN

No. 26

December, 1959

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CONTENTS

Preservation of Fish by Boiling	1
General Trends:	
Submarine for Fisheries Research	6
Plastic Boats	6
Welded Aluminium Boats	7
Navigation by Electric Wire	7
Ultrasonics to Locate Fish	7
Ultraviolet Light	8
Small Trawl Doors	9
Strain on Trawls	10
Electric Trawl Cable	10
Live Bait Fishing	11
Bulk Thawing	11
Lemon Juice to Preserve Shrimp	12
Tuna in Agar Jelly	12
Heart Disease and Fish Liver Oil	13
Black Pearls	13

— Contents continued overleaf —



INDO-PACIFIC FISHERIES COUNCIL

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

BANGKOK

THAILAND

News from Member Governments:

Australia	14
Burma	14
Ceylon	15
India	16
Indonesia	19
Japan	27
Korea	29
Federation of Malaya	30
Pakistan	34
Philippines	36
U.K. : Hong Kong	37
U.S.A. : Hawaii	41
Viet Nam	43

FAO Activities :

Director-General	44
FAO Conference	44
Staff Movements	45
Technical Assistance	45
Fellowships	46
Training Centers	46

IPFC Affairs	47
------------------------	----

Personalia	49
----------------------	----

Current Reading	49
---------------------------	----

Meetings and Conferences:

Biology of Sardines	52
Atomic By-products	53
Food Additives	55

Forthcoming Meetings and Training Centers	56
---	----

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The Food and Agriculture Organization (FAO), a Specialized Agency of the United Nations, was established in 1945 at a conference in Quebec, and followed the decision of the United Nations Conference on Food and Agriculture at Hot Springs, Virginia, 1943, to set up an Interim Commission to draft a constitution and plan the organization. For the first years of its life, the Headquarters of the Organization were in Washington, D.C., but in 1951 they were moved to Italy, where they are now established at Viale delle Terme di Caracalla, Rome. From an initial 42 signatures, the member countries of FAO have now grown to 78; the official languages of the Organization are English, French and Spanish.

The aims and functions of FAO, as set out in its Constitution, include the collection, analysis, interpretation and dissemination of information concerning nutrition, food and agriculture (including fisheries); the promotion of scientific, technological, social and economic research in these fields, and, where appropriate, recommendations for national and international action for the conservation of natural resources and the adoption of improved methods of production.

To accomplish the tasks set by such broad aims, the Director-General has established Technical and Economic Departments, as well as the usual administrative services. The Technical Department consists of several Divisions, one of which, the Fisheries Division, is concerned with all aspects of fisheries industries and the living resources of the seas and inland waters. The Fisheries Division, under the direction of Dr. D. B. Finn, is organized into three Branches—Technology, Economics and Statistics, and Biology.

The manuscript of "Current Bibliography for Aquatic Sciences and Fisheries" is produced by the Biology Branch of Fisheries Division, using its own collections of published material and the facilities and services of the FAO Library.

Systematic scrutiny and abstraction of scientific literature pertaining to fisheries resources was started by the Branch in 1955 to provide the sources and compilations of information on which its programme of work, to promote the

development and application of fisheries science, was based. It soon became apparent that a comprehensive reference list could not be prepared without the assistance of research institutions, librarians and regional fisheries organizations such as the International Council for the Exploration of the Sea, the International Commission for the Northwest Atlantic Fisheries, the Indo-Pacific Fisheries Council and the General Fisheries Council for the Mediterranean. Many of these bodies have arrangements for literature searching in a particular subject field or for a certain geographical area, and publish bibliographies, accession lists and so on. Accordingly FAO began, in 1958, to issue each month a mimeographed document entitled "Current Bibliography for Fisheries Science" which was exchanged with collaborators who were contributing in various ways to their master reference list.

Distribution of these mimeographed documents was steadily increased during 1958 and 1959 to meet the demands of research workers and librarians who had learnt of the existence of the list and recognized its value to them as an aid in their own work. In these circumstances, the demand soon outstripped the possibilities of distributing the "Current Bibliography" in its original form, and permission was kindly granted by FAO for the manuscript lists—which are still prepared primarily as a document for internal use by FAO—to be printed and published for general distribution on a subscription basis.

All members of the staff of the Biology Branch contribute to this Bibliography. The Branch consists of three Sections, responsible respectively for Marine Resources, Inland Resources, and Research Programmes. The last Section has a Documentation Unit responsible for the day-to-day coordination of the bibliographic work of the Branch; copies of publications to be indexed (including reprints), notice of errors found by readers and other such offers of assistance, should be addressed to:

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The Biology Branch is able to provide limited help to recipients of this Bibliography in matters connected with fisheries documentation. Such help may include reference to the existence of translations of indexed papers, provision of addresses of authors, and of special short bibliographies or subject reviews when they are available; copies of indexed papers cannot, however, be provided save in very exceptional circumstances. All technical enquiries should be addressed directly to the Branch Chief and *not* to the publishers.

Although Volume 1 appeared in mimeographed form during 1958 and Volume 2 in 1959, they contained references to the literature published in 1957 and subsequent years. This, the first printed volume (Volume 3), will continue according to the same principle, 1957 being the base year. References to most 1957 and 1958 publications have, however, already appeared in the mimeographed volumes, as also has a substantial proportion of the 1959 publications. None of these will be repeated in the printed volume which will therefore only be complete for 1960 and subsequent years of publication. FAO has available in Rome small numbers of most issues of the first two volumes, which, while the stock lasts, will be mailed free on request to research units.

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September 1959

PRESERVATION OF FISH BY BOILING*

In the countries of the Indo-Pacific Region, a large part of the population suffers from deficiency in animal protein, and there exists a great need not only for development of the fisheries but also for a more widespread use of the catch. In most of these countries with nearly half the population of the world, the known fisheries resources are only partially exploited.

Lack of distribution and marketing facilities for fresh fish in this Region is indeed one of the serious factors which is hindering the fuller exploitation of the fishery resources and modernization of the technologically backward fishing industry. Fish is a highly perishable food and spoils rapidly under tropical conditions unless iced or processed without delay. Ice factories and cold storage warehouses are very limited in number so that the fish catch can be used only immediately after collection and very near the coast. Therefore newer and cheaper techniques of processing and preservation are needed. A large quantity of fish is processed in the Region by traditional methods and this is consumed either as staple food or as condiments. Most of the processing methods involve salting, fermenting, drying and in some cases smoking. In many countries, salt for fishery purposes is not sufficiently pure and the salted fish is of a low quality. Dried fish, with or without salting, is prepared by unhygienic methods; the resulting product is unattractive, in many cases contains sand particles and is generally unpalatable. Such products

fetch low prices and are consumed mainly by the poorer sections of the population. Even though large quantities of processed fish are produced, there is an unsatisfied demand for fresh fish or fish which can keep in good condition for limited periods. Generally, a product in which the natural shape and the muscular structure is preserved, is preferred. In this connection, boiling of fish in water would undoubtedly offer possibilities of producing a product which can be used as a cheap substitute for fresh fish but with a much longer keeping quality than fresh fish under tropical conditions. During periods of glut, the fish can be boiled and transported to inland markets in good condition.

Boiling of fish in water with or without salt and/or other substances, followed or not by subsequent processing, for preservation for short periods under tropical conditions, has been commercially practised for a long time in many countries of this Region (e.g. Cambodia, China [Taiwan], Federation of Malaya, Indonesia, Japan, Korea, Philippines, Thailand, Viet Nam etc.). The processing techniques, although mainly based on rule-of-thumb methods and are handed down to successive generations by tradition, are fundamentally sound in principle. A few points concerning the existing practices in the commercial production of boiled fish in these countries are worth noting.

1. Condition of the Raw Material:

In most cases, the fish will be at least a few hours old out of water and due to

* A note prepared by Dr. G.N. Subba Rao, Technical Secretary, IPFC Technical Committee II.

inadequate icing, if at all the fish are iced, the temperature of the fish is not likely to hinder the rapid development of spoilage. During brining and boiling, much of the substances responsible for the smell of incipient spoilage will be leached out, so that in the boiled product, they are not so apparent. In the small boats, it is impracticable to boil the fish onboard during the fishing operations but on bigger boats as well as fish carriers which do not have sufficient refrigeration capacity, the preservation of fish during periods of glut by boiling onboard is a possibility.

2. Composition of Salt: It is well known that the presence of small amounts of impurities in salt have a considerable effect on the flavor, color and texture of salted fish. Fish salted with pure salt (NaCl) is soft, flabby, and is light yellow or cream in color. A small amount of gypsum as an impurity not exceeding one percent produces a whiter flesh than pure NaCl. Calcium chloride and magnesium salts retard the penetration of salt into fish, and cause whitening and stiffness of the flesh. Iron and copper compounds even in traces have a tendency to stain the flesh yellow. When fish is boiled in brine containing impurities, the appearance, texture and flavor are dependent on the type and amount of impurities present. While a large amount of published information is available concerning the effect of impurities in salt on the quality of salted fish, no data are available on the effect of these impurities on the appearance, keeping quality, texture of muscle, color, and flavor of boiled fish. Use of preservatives along with salt seems to be unknown though some research has been carried out in India on the use of benzoic acid, acetic

acid, sodium nitrite, hexamethylene tetramine, etc., for semi-dried prawns.

3. Cooking Process: The duration of boiling varies from a few minutes in Cambodia, Federation of Malaya, Thailand, etc., to as long as five hours in some parts of Viet Nam. The duration is determined by market requirements, such as salt content and desired keeping quality. Boiling for several hours may not be necessary as cooking and sterilization of the flesh and maximum penetration of salt may be expected to be effected within a much shorter time. To enhance the keeping quality, the boiled fish is in many cases subjected to a second boiling process for a few minutes. Optimum concentration of the brine and the duration of the cooking, taking into consideration the consumers' taste, and keeping quality, have been worked out more by tradition than by any scientific investigation and this, of course, varies with the species of fish handled and its chemical composition, particularly fat content, and also its freshness. Steaming of fresh or brined fish instead of boiling in brine is not known to be practised commercially.

4. Packaging, Storage and Distribution: To ensure maximum keeping quality, it is necessary that the boiled fish is not contaminated before it reaches the consumer. External contamination is retarded by using as shipping containers the same baskets or pots that are used for boiling the fish. Attempts have been made to seal the pots so that external contamination is inhibited. Recent developments in new synthetic packaging materials which are moisture-proof, airtight, flexible, transparent and heat-shrinkable, offer possibilities of sterilizing the fish in the package or

packaging the boiled fish under sterile conditions in a sterilized package. In this connection, one may note that a similar technique is used in the packaging of Japanese fish sausage. Most of the new synthetic packaging materials have to be imported and are expensive when compared with traditional natural packaging materials. The cost of the packaging and shipping containers will necessarily have to be low and improvements in the traditional methods and materials are needed to ensure maximum keeping quality and inhibit external contamination from dust, flies, human hands, etc.

The main object of boiling fish is to extend its keeping quality by a few more days under tropical conditions. The keeping quality at room temperature varies from two days to seven days if the fish are merely boiled for a few minutes without any further processing such as drying, smoking, roasting, etc. Storage time can be extended if the product is kept in a cold room. It is noted that in some cases the fish gradually harden during storage and palatability is decreased if storage period is extended. Boiled fish which are subjected to further processing such as drying after boiling have a much longer shelf life which may be up to a year.

In Thailand, it is reported that if the boiled fish is stored in a domestic refrigerator for periods up to 14 days, there are no visible signs of spoilage but the fish gradually becomes too hard and firm. In Japan, studies have been directed to prevent development of rancidity in boiled-dried products.

5. Microbiology: The boiling process if continued for a sufficiently long period should ensure complete destruction of

the spoilage bacteria and the enzymes. No information is available on the microbiology of the boiled fish and the extent and effect of external contamination by dust, human hands, flies, etc., on the keeping quality of the product. Some research has been carried out in India on semi-dried prawns, a product which is boiled for a short time ("blanched") and then brined and partially dried. About 98.5% of bacteria are destroyed by blanching and 99.5% by brining after blanching.

6. Chemical Composition and Nutritive Value: After boiling, some water is lost from the fish muscle and some salt is absorbed. Due to wide variations in the cooking times employed in different countries, it is not clear to what extent the nutritive value of the boiled fish is affected by repeated boiling or by boiling for extended periods which may be up to five hours. It is well known that continued exposure of protein to high temperatures will adversely affect its nutritive value. There is also the question of loss of other nutrient substances, such as vitamins, etc., which are leached out into the brine.

Summing up, boiling of fish to extend the keeping quality for short periods under tropical conditions opens up the possibility of widening the market for fish particularly in those places where facilities for handling, chilling and distribution of fresh fish are lacking. The process is simple, cheap, and traditional packaging methods can be used and the keeping quality can be extended up to some seven days under tropical conditions by simple boiling and to several months by subsequent processing such as drying, smoking, etc., after boiling. The

traditional methods may require some slight modifications to ensure that processing and packaging are done under optimum conditions: (1) to destroy as much as possible, bacteria and enzymes causing spoilage of the fish; (2) to employ the right quality and quantity of

salt and/or other substances to be used; (3) to prevent external contamination by dust, flies, direct contact by human agencies, etc. and thus increase the shelf-life; and (4) to prevent any adverse effect on the nutritive value by prolonged heat treatment.

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GENERAL TRENDS

Submarine for Fishery Research

The Soviet Submarine NORTHERNER (translation of Russian name) returned from a successful 24-day scientific cruise, early this year, after covering 4,000 miles. This was the submarine's second trip, the first being her maiden voyage in the Barents sea following trials. Manning the vessel were scientists from the U.S.S.R. Institute of Marine Fisheries and Oceanography. The trip established at what time of day or night and at what depth various fish are most likely to be located. It was ascertained that at night the herring were in a passive state and did not react in any way to the advance of the vessel nor to the glare of her lights. The submarine is equipped with underwater television for research directly overhead; echo sounders operating upwards and downwards; instruments for taking exact measurements of salinity, illumination, temperature, rate of flow, and the percentage of oxygen dissolved in seawater. Instruments incorporate all the latest techniques in radio and electrical engineering making for completeness and efficiency. (*National Fisherman*, June 1959).

Plastic Boats

Fishing boats of up to 40 m. in length can be constructed from glass-reinforced plastic. The glass-reinforced plastic referred to as Polyester/Mat or P/M consists of a laminate made of several layers of 68g./m² glass fiber mat impregnated and bonded together with a cold-setting polyester resin. The cold-setting polyester resin is an almost colorless

liquid that can be stored for considerable periods in a cool place. It is activated by the addition of small quantities of two other chemicals, one of which acts as an accelerator and the other as a catalyst. These cause the resin to set within a predetermined period of time. For boat-building purposes, it is usual to arrange for the resin to set in 30 minutes. Glass mat is made of short lengths of glass threads disposed at random and loosely held together like coarse felt. The glass threads are composed of glass fibers each of which is about one-tenth the thickness of human hair. Glass fibers are astonishingly strong and flexible.

For construction of a hull, glass mat is laid into a mold and impregnated with polyester resin by a "wet layup" process which consists of the following: (1) The surface of the mold is treated first with a separating agent such as wax to ensure that the laminate will not stick to the mold. (2) A skincoat is then applied by painting or spraying the surface of the mold with a film of polyester resin. This film, which usually is colored, eventually becomes the outside surface of the laminate. (3) The next stage is to apply a layer of glass scrim (loosely woven glass cloth) and resin. (4) When the scrim has hardened, successive layers of 68g./m² glass mat impregnated with resin are applied until the desired thickness has been built up. Hulls that are less than 9 m. in length require only three layers of mat, which means that they will be about 4.8 mm. thick. Hulls that are 9 to 12 m. long require 4 to 5 layers, 12 to

17 m. hulls require 6 to 7 layers, and 17 to 24 m. hulls require 7 to 10 layers of glass mat.

The tensile strength of polyester resin by itself is about 560 to 635 kg./cm². After it has been reinforced by 68 g./m² glass mat, the minimum tensile strength of the resulting laminate is 1050 kg./cm². Because the mat is composed of glass threads that are disposed in all directions, the laminate has tensile strength in all directions. Although P/M laminate is strong, it also is flexible. A P/M hull is made both stronger than timber and equally rigid by stiffening the skin of the hull with hollow P/M "top hat" transverse frames similar to the frames used in a timber hull. The frames are made by molding P/M over thin aluminum formers. (*Norwegian Fishing News*, Vol. 6, No. 1, 1959).

Welded Aluminium Boats

Aluminum gillnetters, new among American fishing boats, are to be used in the Alaska salmon fisheries. The aluminum gillnetters, powered by 165-h.p. gasoline engines, are reported to have a speed of 15 knots in preliminary tests, compared with eight or nine knots for most gillnetters. In addition to speed, which is important in Alaskan waters where the fishing season is short and fishing hours are regulated, load capacity, efficiency and quietness of operation were noted by fishermen who were aboard during test runs. The aluminum hulls are unpainted and will require no maintenance, affording substantial savings to the operator. Fishing boats of other materials require periodic surface repair including scraping and painting. The boats are 9.76 m. long, with a beam of 3.5 m. and a draft of 0.78 m. They are of all-welded construction, utilizing Kaiser

Aluminum alloys 5086 (sheet) and 5083 (shapes). It is estimated that they are only two-thirds the total weight of other comparable boats. Fish capacity is large, about 12 tons each. (*Fishing Gazette*, July 1959).

Navigation by Electric Wire

Navigation of a vessel along an electric wire placed on the sea bottom was recently demonstrated between Sweden and Denmark by two Swedish inventors from Malmo, Sweden. A film of the demonstration was shown on the Swedish television circuit on 7 May 1959. An electric wire in the form of a triangular track was laid at the bottom of the sea and the navigator of a motor boat followed the electric wire with the assistance of an oscilloscope. The navigator operated in a closed room and had no view in any direction, thus being restricted to navigating solely with the aid of the oscilloscope and the electric wire. When a vessel fitted with an oscilloscope is above the electric wire, an arrow on the instrument used by the navigator will point straight down. Should the vessel deviate from the wire, for example starboard, the arrow will point to the port side of the vessel, or vice versa. This system of navigation, it is claimed, could be very useful in narrow channels and ports as well as in darkness and fog. The electric wire is connected to the ordinary Malmo city lighting system. (*Commercial Fisheries Review*, July 1959).

Ultrasonics to Locate Fish

A transmitter and a receiver, which the Japanese suspend over the side of the vessel at a depth of 1.5 m., record the movement and the density of fish schools and the depths in the sea at which they occur. During daylight the

fish were usually at depths between 30 and 50 m., but toward dusk they rose to shallow depths. Fish schools concentrate in the deep-scattering-layer and pelagic organisms concentrate in layers throughout all oceans at varying depths and rise toward the surface at night. The fish captured in that layer were satiated with *Euphausia*, small shrimp-like crustaceans. When the deep-scattering-layer was near the surface, the fish catches improved and the water became less transparent. The large abundance of plankton, the passively floating or weakly swimming animal and plant life, caused the decline in transparency. The Japanese believe their equipment, which they are trying to improve, will lead to improved fishing methods. If they can use this technique on a large scale, they will improve materially their salmon catch, without increasing the present expenditure of effort. (*Commercial Fisheries Review*, August 1959).

Ultraviolet Light in Underwater Research

What is believed to be the first report on the use of ultraviolet lights by divers in underwater research, states that in addition to opening up a new technique of exploration, the preliminary findings may be of considerable interest to marine biologists, geologists and archaeologists. This work was conducted at depths of 5.5 to 9 m. in the waters of Northwest Harbor, Deer Isle, Maine, U.S.A. during August 1958, using hand-carried ultraviolet lights. Self-contained breathing apparatus was used throughout and all dives were conducted at night. Two ultraviolet lights, were used, each light completely self-contained and consisting essentially of a

G.E. 6 watts tubular ultraviolet lamp, as an ultraviolet light source (about 3500-4000 Å.) which was energized by a 6-V. battery-driven circuit consisting of an interrupter making and breaking the current to the low voltage side of a transformer. Sufficiently high voltage was obtained from the transformer 'secondary' to cause a discharge through the ultraviolet light tube.

Five preliminary findings merit presentation: (1) There is general prevalence of fluorescence (often extremely beautiful) under ultraviolet irradiation of much of the material, matter and objects occurring, growing and making up the ocean bottom, in the waters explored. (2) The difference in the observed fluorescence of many objects removed from the water and the same objects, *in situ*, for example, 'coralline algae', which out of water generally fluoresce rose or pink, in their natural habitat appear to fluoresce white. (3) There is apparently absence of any significant fluorescence of the suspended matter in the naturally turbid Maine waters, and the absence of any dazzling Tyndall beam phenomenon. This made it possible to see objects (which fluoresced) approximately eight times beyond the range at which such objects could be seen through these waters using natural light or during the daylight hours. Normal visibility is about 1.8 m. in these waters. At night using ultraviolet light, fluorescent objects approximately 15.2 m. away could be detected. This latter suggests, because of the natural fluorescence of the human skin (of light-skinned persons) and the fluorescence of white clothing, particularly clothing washed in modern detergents which contain optical whiteners, that searches in turbid and sediment-filled waters for

bodies of the drowned persons might best be conducted in the dark, at night using ultraviolet light. (4) The fluorescence of the bottom, in mud areas, under which long-submerged pieces of ships' timbers were known to be buried, appeared to be significantly different from areas which were free of timber. This suggests the use of ultraviolet light as an aid in locating the presence of artefacts buried in mud. (5) The fluorescence of naturally fluorescent petroleum intermixed with seabottom mud, which suggests the possible value of ultraviolet light in submarine prospecting for petroleum and fluorescent minerals. (*Nature*, July 1959).

Small Trawl Doors

New type of small trawl doors specially developed for use with a 8.2 m. double-ended launch powered by a 22 b.h.p. Diesel are stated to be cheaper, easier to construct, lighter to handle, and much more convenient to adjust for varying fishing conditions than are the conventional doors. The doors are 91.4 cm. long by 61 cm. high; are built of 1.27 cm. boarding running vertically; and are backed by three horizontal battens, each 91.4 cm. by 7.62 cm. by 2.54 cm. Fastenings are 5.1 cm. galvanized wire nails with the ends bent over. The ideal wood to use is tough, reasonably light, and not subject to warping. Sufficient ballast normally is provided by a plate of iron or steel measuring 91.4 cm. by 6.3 mm. with its leading end cut in a curve to form a runner. The plate is bolted to the lower batten of the door, and the wood is trimmed to the same curve as the metal. On soft ground, there is no need for a metal shoe to protect the wood from chafing on the bottom, as there is

when the gear is used over hard grounds. The ballast at the bottom of the doors causes them to remain on end if the boat stops towing and thus tends to prevent tangling when fishing is resumed. The towing bridle consists of three short pieces of 6.3 mm. galvanized chain. The upper chain is 51 cm. long, the after chain and its shackle 40.6 cm. and the lower chain 45.7 cm. The lower chain is shorter than the upper in order to make the door dive. A ring, 5.1 cm. in diameter, is welded through the ends of the three chains. The end of the towing warp is shackled to this ring. Heavier chain may be advisable. The after chain is shackled to a strip of iron measuring 40.6 cm. by 3.8 cm. by 6.3 mm. with a 19 mm. hole bored in either end that is bolted to the door on top of a wooden wedge. The wedge is 25.4 cm. long and rises to 7.62 cm. in height. The bolts go through the central batten on the other side of the door. The wedge is to cant the front of the door outwards as soon as a strain comes on the gear in order to start the door planing. The upper and lower chains go through 2.54 cm. holes bored through the doors, are as close to the inner edges of the battens as possible, and are 20.3 cm. from the front of the door. The net is towed from the end of the iron strip as shown in the diagram. The adjustment of the doors is simple. The after chain is never altered. To make the doors fish wide apart, both upper and lower chains are lengthened; to make them fish closer, both chains are shortened. To make them fish deep, the lower chain is shortened; to make them fish shallow, upper and lower chains are about equal. (*World Fishing*, January 1959).

Strain on Trawls

A new electronic device which fits easily on a conventional trawl winch, and which not only saves the net from being torn or lost, but tells how much fish is in the net, is in the process of being patented by an Italian inventor. The device is the successor to an earlier invention which measured only how many fish were in the net. The new device which is a very simple arrangement is claimed to be of great value to the trawling fleets of the world. It will be especially useful to deep-sea trawlers, and boats dragging in rough waters. The device consists mainly of two hinged collars attached to the terminals of the winch. Two dynamometers fitted with electroacoustical devices are coupled to the collars, and anchored to the deck. Main purpose of the invention is to avoid destroying the net on rough bottom, or on obstacles unseen on sounding equipment. It will also, by measuring the strain on the towing lines, give a measure of how much fish is in the net. A warning signal, working through a voltmeter, is placed on the bridge and in the engine-room, giving a permanent and instantaneous reading of the strains developed by the trawl. A horn is sounded and a red light flashes immediately when the net becomes fouled on the bottom or on an obstacle. The device is so set up on the winch that it automatically disengages when the strain reaches the danger level. When this brake is released the winch is then running free, letting out line until the net is free, or until the ship is stopped or diverted. (*Commercial Fisheries Review*, July 1959).

Electric Trawl Cable

A number of advantages are visualized as possible for application of elec-

tronic equipment to industrial fishing as result of development of the electric trawl cable. **(1) On-Bottom Indicator**, which is a comparatively simple spring-loaded switch on the bottom of the trawl door, is closed by pressure of the trawl door on the sea bottom. When the doors are functioning properly a light burns in the pilot house. If the trawling speed is too fast, or currents are encountered which affect the function of the gear, so that in either case it tends to rise off the bottom, the light in the pilot house goes out. This device, which becomes possible of application through the electrical cable, is believed to carry promise of real benefit to trawlers. Other devices can be attached to the special cable making it possible for a vessel to use the cable to its capacity in monitoring and telemetering information from the ocean floor. This information can be transmitted to one observer or several at various stations. **(2) Ground Speed Indicator** based on a speedometer-like device, could report the actual rate of movement of the trawl over the ground without reference to wind, current or propeller r.p.m. This would permit more precise adherence to bottom contours and a fishing course than is possible on the basis of time/r.p.m. or even echo-sounding. **(3) Thermometric Fishing** may become practical and this method is based upon observations that fish concentrations may be governed by relatively minor temperature variations. As water temperatures affecting concentrations of trawl fish become known it should be a relatively simple matter for the fisherman to be supplied with precise information as to the bottom temperature at which his gear is fishing through data transmitted by the electrical trawl cable. **(4) Attraction by Light** under water

is practiced in numerous fisheries throughout the world, and appears to be one of the promising avenues for increasingly effective fishing. Although not well demonstrated so far as trawling is concerned, there remains the very good possibility that proper lights and wave lengths may be developed to attract fish into the paths of trawls. Light on the head or foot rope could be readily provided with current through the electrical trawl cable. **(5) Monitoring the Catch** in a trawl is possible by a device which reports changes in the strain between the trawl and the doors. **(6) Depth Telemeter** is a vital factor for fishing with a mid-water trawl, where knowledge of the exact depth at which the net is fishing is necessary. Devices based on acoustic principles may be affected seriously by distance, current, wake and ambient sea noises. **(7) Underwater Television** is a tool for the scientist rather than the industrial fisherman and its actual employment in research has been made possible through the use of the special electro-mechanical cable. (*Pacific Fisherman*, September 1959).

Live Bait Fishing

American (U.S.) method of catching tuna by using live bait has spread to other countries. A modified type of U.S. tuna clipper will operate from the Canary Islands under the ownership of an Italian-Spanish combine and will fish for tuna by the live bait method in the South Atlantic. The catch will be taken to Genoa where it will be processed and canned. This development owes its origin to the First FAO International Fishing Boat Congress (1953) when interest was expressed not only on the design and construction of American tuna clippers but also the method of fishing.

The rapidly growing importance of tuna also contributed to this development. The world catch of tunas, bonitos, mackerels, etc., in 1938 was about 840,000 metric tons. By 1948 the industry had largely recovered from the ravages of World War II and landings had increased to more than 900,000 tons. Since then the increase has been spectacular—the statistics for 1957 show a catch exceeding 1,800,000 tons. Tuna has, of course, been for centuries a commercial fish in the Mediterranean but in recent years local supplies have not been enough to meet the demand so that imports of canned tuna, especially from Japan, have increased considerably. At the same time, this demand has led to European nations seeking to develop their tuna fishing industry. The French, for example, have built up a flourishing tuna fishery in the South Atlantic, based at Dakar, West Africa. In 1953, trolling for tuna in home waters was practised but largely as a result of the influence of U.S. designs live bait is being used. Many French tuna fishing boats are using the live bait method.

Bulk Thawing

A bulk thawing method for frozen fish has been developed in the U.K. which thaws the entire mass at a uniform rate. The Torry Research Station's (Aberdeen, Scotland) dielectric machine will thaw frozen fish in 15-20 minutes as against 12-24 hours required by older methods. The cost of a machine handling a ton of fish an hour is estimated at \$28,000 and requires only a few yards of floor space. In dielectric heating, two plates some feet apart are charged alternately 40,000,000 times a second with thousands of volts. To control the process further a method has been evolved for passing the

frozen fish blocks on a slowly moving conveyor belt between the plates. (*National Fisherman*, August 1959).

Lemon Juice to Preserve Shrimp

The use of lemon juice to retard spoilage, preserve flavor and prevent discoloration in the processing of shrimp has been gaining widespread attention in the U.S. seafood industry. The following are important properties of lemon juice which are of interest to fishing industry: (1) Lemon juice is nature's most effective antioxidant. (2) Lemon juice is a buffered acidic system capable of a great range of dilution. (3) Lemon juice will discourage the growth of many microorganisms which affect flesh and muscle. Unsterilized foods such as raw shrimp or other seafood treated with lemon juice show a marked reduction in bacterial count. (4) The enzymatic action producing darkening of certain seafoods (shrimp) and that associated with the proteolytic breakdown of all seafood is retarded by the use of lemon juice. (5) Certain ingredients in lemon juice are good sequestering agents and will suppress the effects of such metals as iron and copper in promoting unwanted chemical reactions in seafood. (6) Lemon juice will neutralize or keep the flesh of fish, lobster or shrimp from becoming alkaline, thus preventing the disagreeably strong "fish-like" odors from developing. (7) Certain combinations of the ingredients in lemon juice contribute to freshness and flavor enhancement in many foods, including seafoods. (8) Lemon juice has a very low surface tension which makes possible very rapid penetration in solid foods and increases its effectiveness. Shrimp should be separated from the trash, heads removed, if for headless shrimp, washed and immediately dunked

into a lemon juice solution of sufficient strength to do three things: reduce bacterial count; tie up the copper in the enzyme tyrosinase; and prevent the oxidation of any protein derivatives that develop. It is suggested that one part of concentrated lemon juice be added to not more than 40 parts sea water. Thus not less than $\frac{1}{2}$ l. of concentrate is added to 20 l. of dip. The basket of shrimp is immersed in the dip for not less than 5 minutes. It is then drained and immediately packed in crushed ice. (*Commercial Fisheries Abstracts*, June 1959).

Tuna in Agar Jelly

The following information has been obtained on the method used by a Japanese canner for packing tuna in agar jelly. A lot of 1,216 pieces of fresh skipjack loins (each weighing about 1.8 kg.) totaling 2,250 kg. was used. The fish was precooked for 60-70 minutes without pressure. The center temperature of the loins was kept as low as possible; it measured 58°-64°C. in some batches and 57°-63°C. in others. After precooking, the loins were cleaned just as for packing in oil. They were then immersed in water at 80°-90°C. for 5 minutes, to facilitate separation of the myomeres. The loins were then pulled apart by hand, a few large segments were packed in the can first, after which the can was filled with flakes and weighed. Finally a few large pieces were put in on top of the flakes to give a good appearance when the can is opened. The can was next filled with a measured amount of hot jelly vacuum-sealed, and retorted for 80 minutes at 0.5 kg./cm.² pressure. The yield from this lot of skipjack was 161.17 cases of canned tuna in jelly, 31.13 cases of No. 5 cans for the domestic market, and 9.3 cases of flake tuna. Re-

covery is given as one case of 196 g. cans of jellied tuna per 13,976 kg. of raw fish.

The formula for the jelly sauce used in this pack is as follows (quantity per case in parentheses): 7.2 kg. powdered agar (58.06 g.), 4.8 kg. cellulose gluconic acid (38.7 g.), 6.0 gelatin (48.4 g.), 0.72 kg. pepper (5.8 g.), 28.8 kg. powdered skim milk (232.3 g.), 25.1 kg. fresh onion juice (202.4 g.), 4.41 kg. refined white sugar (35.56 g.), 15.6 kg. salt (126.8 g.), 5.25 kg. cottonseed oil (42.3 g.), 2.4 kg. monosodium glutamate (19.3 g.), 0.6 kg. water, 48 ml. spice mixture "A" and 150 ml. spice mixture "B" (apparently standard food flavoring mixtures imported from the United States).

Heart Disease and Fish Liver Oil

In contrast to animal fats which increase the serum cholesterol level in the body, oil from marine animals, seals, sardines and whales, seems to lower the level. Since cholesterol is believed to be associated with atherosclerosis, recent research reported on the potent cholesterol-level-reducing-activity of cod-liver oil may be important in human medicine. It is more potent than some vegetable fats tested. Rats fed a diet of starch, to

which cholesterol and coconut oil were added, received both corn oil and cod-liver oil as dietary fats. The fish oil had a higher cholesterol-lowering activity. The fatty acid fraction accounts for most if not all of the activity. (*Nature*, April, 1959).

Black Pearls

Beautiful black pearls have been recently produced artificially by exposing the core of a white pearl to atomic radiation. Pearls undergo a discoloration process when they were bombarded with neutron rays. When a black pearl is cut in half only the core of the pearl is black. The outer layer of the pearl is not affected by the radiation. The mother-of-pearl nucleus in the pearl contains a small amount of manganese, which turns black when exposed to radiation for a long time and light blue and grey when exposed for a short time. Manganese turns black because it undergoes oxidization when subjected to atomic radiation. The pearl appears black because of the black luster of the nucleus, etc. or core. It is stated that this is the first time that a black pearl has been artificially produced in Japan.

NEWS FROM MEMBER GOVERNMENTS

AUSTRALIA

Fish Canning Industry

Australia imported large quantities of canned fish before World War II. During the war years, much effort was put into developing the fish canning industry. To protect its young industry, the Government imposed restrictions on the imports of canned fish. This hurt several exporting nations, especially Norway. At present, Australia has 17 fish canning factories. Most of them were built recently and are equipped with the most modern facilities, including refrigeration units for storage. A few factories have special installations for holding fish in sea water at temperatures of 0° - 1° C., which keeps fish fresh for 7 or 8 days. Production of canned fish totals about 3,000 tons annually, but an additional 3,000 is imported each year to satisfy the demand. (*Industria Conserva*, January 1959).

Tuna Landings

Landings of tuna from the late fall and winter fishery off South Australia and New South Wales were over 2,369 tons, or more than 68% higher than the 1,495 tons reported from the same areas the previous season. The landings in South Australia and New South Wales make up about 90% of the tuna landed in Australia. Most of the tuna landed in Australia is canned or frozen. As a result of an early 1959 visit of an Australian trade mission to the U.S.A. there is some prospect that tuna shipments to west coast U.S.A. canners will be resumed. The last shipments were made on a trial basis in 1951 and 1955. Exports of all types of tuna (frozen and canned) to the U.S.A. and other countries is not likely to exceed 2,000 tons. (*Comm. Fish. Rev.*, July 1959).

BURMA

It is reported that the Burmese Government is seeking to have canned fish included in reparations goods from Japan this year for the third year. The Japanese Fisheries Agency, Foreign Ministry and Ministry of International Trade are agreeable if the quantity is about half of that supplied last year and the year before. The problem is obtaining agreement between the sardine and

mackerel-pike export packers. Last year the whole amount was canned mackerel-pike, whereas the year before it was half mackerel-pike and half sardine. The sardine export packers association is determined to supply at least half of the shipments this year to Burma. The current price of sardines is slightly higher than that of mackerel-pike. (*Comm. Fish. Rev.*, September 1959).

CEYLON

The Extension Service Newsletter No. 16 of the Department of Fisheries, Ceylon, dated 15 September 1959 gives the following information :

Mechanization

Since the new scheme of granting loans for mechanization started on 1 October 1958, much interest has been created even among non-fishermen with the result that several interested persons have invested in mechanized boats. During the month of August 1959, 33 boats have been launched, 25 of which have been financed out of Government loans, thus bringing the total number of mechanized boats to 194. The total number of indigenous craft (oru, vallam & teppam) which have so far been mechanized by the installation of out-board motors is 32. During the early part of this month the Negombo mechanized boats landed very large catches of Seer, by trolling, with the result that the price of Seer in the Colombo markets fell to Rs. 2.2./Kg. The mechanized boats operating in the Trincomalee area also landed very large catches during the latter part of July 1959. One of the fishermen from Negombo, who originally took up mechanized fishing in a 7.92 m. Taos type boat in March 1958, has on 6 August 1959 launched a 40 ft. 12.19 m. boat powered by a 45 h.p. Yanmar Diesel. This boat is also equipped with a line hauler. The owner expects to operate this boat especially for tuna longline fishing using 500 hooks as compared with 125 hooks used in other mechanized boats which are engaged in tuna longline fishing at present.

Training of Fishermen

The departmental training boat "NORTH STAR" has been working on the

East Coast since last April, training local fishermen in tuna longline fishing. Five or 6 trainees are taken out on each trip which takes about 14 hours. The gear used for demonstration is a set of tuna longlines consisting of 200 hooks. During the month of July 1959, this boat has done 17 fishing trips catching 7,836 Kg. valued at Rs. 7,844.32.

Engine Maintenance Courses

In view of the large number of owners and prospective owners of mechanized boats in the Negombo area, it was found necessary to conduct three courses in the operation and maintenance of Marine Diesels at Negombo. These courses were conducted by the FAO Marine Engineering Superintendent, Mr. E.R. Kvaran. The first course had a regular attendance of twenty seven trainees. Twenty five trainees attended the second course and the third course was attended by forty trainees.

Loans for Mechanization

Loans not exceeding Rs. 17,500/- granted for the purpose of acquiring mechanized boats and modern gear to individual fishermen will in future be granted to members of Fishermen's Cooperative Societies only. These loans which were free of interest are now subject to a charge of 3% interest and repayable within 36 months.

The Extension Service Newsletter No. 17 dated 15 November 1959 gives the following information:

Loans for the purchase of mechanized boats will, in future, be confined solely to Fishermen's Cooperative Societies. There are two main types of societies eligible for these loans, now being

registered, namely, Cooperative, Fishing Society in which the boats and equipment remain the property of the society, while in the Production and Sales Society, the boats and equipment remain the property of the society only till the loans obtained for their purchase are repaid; thereafter the boats and equipment will be owned individually. Model by-laws and working rules for these societies have been prepared by the Cooperative Department and detailed rules have been formulated by the Fisheries Department in regard to the utilization and repayment of these loans. These are available at all Fisheries Offices in Ceylon.

House Construction for Fishermen

House construction for fishermen is undertaken by the Government in order to give them an incentive to harder work and better production. These methods are employed for the construction of these houses: (1) One method used is to alienate land to fishermen and to give them a subsidy for the construction of houses on the same terms and conditions as for allottees under the Land Development Ordinance. An annual payment of 2% of the cost of the land is made by the occupant of each house. (2) Departmental construction is also carried out on the tender system. The occupant makes an annual payment of 2% of the cost of the land. (3) The

third method employed is by means of a grant to local authorities who are prepared to undertake the construction of houses. Maximum rent recoverable from an occupant is Rs. 6/-per month.

Longline Fishing

At Trincomalee three out of the fourteen mechanized vallams are to take up floating longline fishing. This method proved so successful during the month of October that the others have also adopted the same method of fishing.

Japanese Aid

Ceylon has requested Japan's full cooperation in a \$ 70 million five-year fishery program scheduled to start in October 1959. The gigantic project envisages construction of harbors, fishing fleets and refrigeration plants. The fishery program was based on a report submitted last fall to the Ceylonese Government on findings of a Japanese survey mission. Despite a huge demand for fish in Ceylon, output is only 30% of the demand and under the five-year project, the amount imported is to be replaced by domestic fisheries. Although it is not yet known to what extent the Japanese Government will cooperate, observers point out that it would be difficult for Japan to participate in the harbor construction project since this would call for an Export-Import Bank loan. (*The Japan Times*, 14 April 1959).

INDIA

Thailand Carp in West Bengal

A species of carp (*Cyrinus carpio*) new to India, was introduced from Thailand last year and has been reared with encouraging results at the West Bengal Government Fisheries Department Fish Farm at Duttabad. The Thailand carp is a strain

of the dwarf type of Chinese origin. This is reported to be the first attempt in India to cultivate this species with a view to ascertaining its compatibility with local varieties. The important characteristic of this species which makes it suitable for conditions in West Bengal is that it is a

prolific breeder and can breed in confined waters year-round. This solves a serious problem of procuring spawn for inland fisheries; most of the West Bengal carp normally breed only in flowing and flooded rivers and lakes. While it has been ascertained that the Thailand carp can thrive simultaneously with local carp without adversely affecting the growth of the latter, further research work is under way to determine whether this species is a competitor of the local carp. The rate of growth of this species is believed to be much greater and produces 50 percent more fish than the local carp. The maximum weight of some of those reared has been 2.7 Kg. while the average weight is about 1.6 Kg. The maximum length attained is 51 cm. The optimum temperature for breeding has been found to be 32°C. Another important aspect of this species is that it grows naturally in confined waters, requiring practically no attention at all during growth. The introduced Thailand carp with its various advantages over West Bengal carp holds out hope for increasing production of fish in inland water areas. Initially, the Fisheries Department contemplates planting a small number of fish in selected ponds and tanks throughout the State where it can breed naturally. (*Comm. Fish. Rev.*, September 1959).

Beach Boat Trials

A program for beach boat trials has been sponsored by the Government of India in collaboration with Governments of Kerala, Madras, Andhra, Orissa and the Indo-Norwegian Project (INP), to be held from October 1959 to end of April 1960 on location along the East Coast and in Kerala. Trials will commence by the end of September at the INP camp near Quilon. The time table of the program to be followed is as under.

15 October—30 November 1959:

Tests and trials at Tuticorin.

1 January—15 February 1960:

Tests and trials at location in Orissa State.

15 March—end of April 1960:

Tests and trials at locations on Kerala coast.

Each State interested in these trials is to depute at least 5-8 *bona fide* fishermen for training in handling of beach boats. These selected fishermen are expected to have some previous experience with small mechanized fishing boats, as well as having at least limited knowledge of the English language to facilitate to receive instructions. The INP will supply the following equipment to be used at all the testing places: 1 handwinch; 1 mechanized winch; 12 steel rollers; 4 grapnels; 5 shore anchors; 2 boat stands; 2 planks, plus sundry equipment from their stocks.

The States of Madras, Orissa and Kerala will supply other equipment such as iron chains, wire ropes, tools, etc.

Conclusions will be drawn at the end of trials in Orissa and again after Kerala trials with special regard to the conditions prevailing on East and West Coasts, respectively. The main points to be considered are: (1) State of training of fishermen participating for handling beach boats at sea, in breakers and on the beach. (2) Suitability of various boat types for intended future work. (3) Selection of prototype design with consideration of necessary charges and amendments. (4) Further work to intensify the introduction of beach boats.

A full report on the whole trials period with special emphasis on the conclusions and recommendations arrived at

will be presented. This report will be worked out by the Central Fisheries Technological Research Station, Cochin, with the help of INP personnel and a FAO Naval Architect.

The costs of the whole trial period are divided between Government of India and the State Governments, the INP supplying equipment and the Organizer.

Program of work consists of: (1) Training of fishermen in handling beach boats in breakers and on the beach. (2) All possible ways of landing and taking off (bow first etc.) are to be tried. Attempts will be limited to safe conditions. (3) All possible ways of handling the boats on the beach to be tried. This included manual handling, handling with handwinch and mechanised winch. (4) Boats should be tested in light condition and under ballast representing fishing gear and average catch to give conclusions as to the location of the center of gravity for optimum performance. (5) Suitability of the various boats for the different tasks to be ascertained. (6) Conclusions as to necessary design changes to be made. (7) Performance of the different engines to be classified.

It must be borne in mind that at present these trials are not concerned with the actual fishing operations but they are strictly beach landing and surf going trials. They are not demonstrations of a finalized prototype of beach boat, but trials to find out how such a boat should be conceived.

Training in Shrimp Trawling

A training course in shrimp trawling has been initiated, the details being as follows: duration of course, 8 months: first 2½ months, lectures & practical; second 1½ months, practical; third 4 months, actual fishing operations.

Lectures will be on the following subjects: classification of trawl nets; terminology; gear materials—selection and use; webbing: kinds of knots, mesh size, length width, weight of webbing; fundamental knowledge about design and construction including take up—cutting of webbing—joining of two different sizes and shapes of nets; designing of trawl nets: drawing method—interpretation of drawings—4 seaming non-over-hang and over-hang trawl nets—2 seaming over-hang trawl nets; relation between H.P. of engine and size of net; otter boards or doors—design and construction; relation between size and weight of otter board and size of net; boats for trawling—characteristics—dock arrangement—stern trawlers and side trawlers; trawl winches—design and mode of working; trawl galleys—design and relative utility; relation between size of boat, H.P. of engine and size of otter door and nets; fishing method—side trawling, stern trawling, trawling speed, length of warp in relation to depth of water; fishing ground; relation between depth of water and size of boat; currents and their effects on trawling; behavior of shrimps; beam trawls for shrimps; bull trawls for shrimps; net mending methods; designing of a shrimp trawl net suitable for the State which the trainees represent.

Practical courses will include: Fabrication and construction of net; fabrication of webbing, assembly of hand-made nets, assembly of machine-made webbing; construction of a suitable shrimp trawl for the State which the trainee represents; methods of survey of different trawl nets in use.

The Course during the second four months will consist of actual fishing operations with hand operated trawl nets for 1 month and winch operated stern trawls and bull trawls for 3 months.

Fishermen Fight 5 ton Whale-Shark

Sixteen men and a giant fish fought for seven hours in the Arabian Sea. The fight took place off Mangalore, India, where two boats with 15 fishermen were operating.

A big whale-shark swimming on the surface with its back fin sticking out of the sea was seen at 1 AM about 13 Km. from Mangalore. The only equipment on board which could possibly be used in an attempt to capture the shark was a 2½-ft. long unbarbed iron hook to which was attached a 2-inch manila line.

The boats were alongside the shark for some time and when the shark tried to swim under the boat the hook was jabbed through the center of the dorsal fin. The two steel boats, one 9.75 m. and one 11.28 m. long, were secured together by a rope and both engines were stopped yet the shark was able to tow both boats at a speed of five knots. The shark, in a great fury, threshed and plunged and dragged the boats about for 20 minutes; then the Manila rope parted. The giant fish swam away with the hook and 15 fathoms of line.

The shark came to the surface again and it was possible to get a nylon line through the eye of the hook. But the shark, finding itself under restraint again, reacted violently, churning up the water in a mad struggle before turning to the open sea, towing the boat with it.

At about 4.30 AM the giant fish slowed down so the line was shortened from 37 m. to 5.5 m. and now had its tail by the bow of the boat. A notch was cut in the upper fin and eight nylon lines looped around it. The fishermen tried to stop the shark from swimming by raising its tail against the bow but it was quickly found that it was not as tired as was believed. No sooner were the lines tightened than the fish made a tremendous leap, lashed about furiously and then plunged to the depths, trying to drag the boat under the sea. Fortunately, the shark hit bottom before the boat started taking in water forward.

The men were now able to wind 16 lines of nylon and a steel wire from the winch around the upper tail fin. By now most of the fight had gone from the monster so that, with the aid of the mechanically driven winch, they were able to secure the tail against the bow and tow the shark towards Mangalore. As conditions were too dangerous that night to tow it up the river mouth to the town, one boat with four men was left at anchor to guard the fish.

At 5 AM next morning the shark was towed in and of the 143,000 inhabitants of Mangalore at least 105,000 came down to the beach to see this monster of the deep. The shark, which was the biggest fish ever seen or heard of in this part of India, was sold for 500 Rupees.

INDONESIA

Fish Processing Research

An investigation has been started recently by the Technological Section of the Sea Fisheries Service on artificial drying of fish. The purpose of this in-

vestigation was to find out the right method and equipment for the drying of fish by artificial means, applicable at remote places of the Archipelago. To meet this requirement, some limiting factors

have to be considered, i.e. the absence of modern forms of power and fuel, and in some cases the scarcity of salt for curing. A kiln-dryer heated with a wood fire was thought to be most suitable for this purpose. A small kiln-dryer was used during preliminary experiments in Djakarta. A kerosene stove was used, however, instead of a wood fire for heating. Medium sized *Caesio erythrogaster* is split and salted with dry salt in the ratio of 2 kg. salt to 10 kg. fish, and stored for 2 days. A loss of weight averaging to 20% was noticed after salting. The salted fish is hung to dry in the dryer. A temperature of about 45°C. is maintained in the dryer. Twelve hours are needed (compared to 20 hours for sun-drying) to dry a limited quantity of medium sized fish. More time will be needed for greater quantities, as no device is provided for increasing the circulation of the air in the densely packed space. Fish dried by this method when compared to sun-dried fish, turned out to be better in quality. The practical and economical aspects of the dryer are being studied.

Fisheries Education

One-year training course for lower sea fisheries extension personnel

In 1958 the second course was conducted and in 1959 the third course has been opened. The number of participants was in 1958, 31 of which 28 persons completed the training successfully.

Fishermen's practical training courses:

- (i) A practical training course for fishermen was conducted in the Bangka/Belitung region (South Sumatra). The course lasted

three months and had 20 participants. The purpose of this course was to introduce to the fishermen of South Sumatra the use of nets from other parts of Indonesia that so far have not yet been used and were unknown to the fishermen of South Sumatra. In this course, sailing crafts were used.

- (ii) Another practical training course for fishermen has been opened this year in Padang (West coast of Central Sumatra).

In this course 2 motor fishing-crafts were used. The purpose of this course is to teach the fishermen the use of motor fishing-crafts and how to catch fish with them, to train the fishermen to be navigators, and to train the fishermen to be engine-drivers.

The course will last one year and is attended by 4 groups of fishermen each consisting of 6 men.

- (iii) This year an engine-driver's and navigator's course for fishermen has been opened in Djakarta.

The course will last 3 to 4 months and is being attended by 15 persons.

Course for intermediate sea fisheries biological personnel.

A one-year course for intermediate sea fisheries biological personnel was conducted in Djakarta from September 1958 to October 1959. Of the 15 persons who attended this course, 14 persons completed their training successfully.

Data on Sea Fisheries Activities

Mechanization of Fishing Industries

During 1955-1958, the fishing industry has spent a total amount of Rp. 94,169,600 on mechanization; 1950-1955—Rp. 63,686,000; 1956-1958—Rp. 30,483,600; total, Rp. 94,169,600.

According to recent figures, the number of motorized vessels in 1958 was approximately 1,320, most of which are owned by fishermen's organizations. It is necessary to point out that mechanization has become popular with the fishery communities in Indonesia.

Extension of Workshops, Shipyards, etc.

- (a) The establishment of a fishing harbor in Surabaya, East Java, started in 1952 with a total budget of Rp. 2,000,000 and is finished and was utilized in 1958.
- (b) The completion of shipyards and slipways of service-stations in Djakarta, Ambon, Ternate and Belawan needed a total budget of Rp.4,438,500 specified as follows:

1951-1955: Rp.3,068,500.—

1956 : Rp.1,370,000.—

- (c) The establishment of a shipyard and a slipway in Tandjung Balai, North Sumatra, is meant to provide facilities for many motorized fishing vessels in this area and to support the effort of building new vessels. The needed engines, provided by the Industrial Service, make a budget of approximately Rp. 1,000,000, while the building-

expenditures are estimated at Rp. 3,500,000, borne by the Sea Fisheries Service. Except the price for the engines, an amount of Rp.3,390,000 has been released from the Rp. 3,500,000. The work started in 1956 and was finished in 1958.

- (d) The establishment of a new Fishery Station in Galala (Ambon, Moluccas) covers a budget of Rp. 6,000,000, of which an amount of Rp.2,730,000 has been spent up to the end of 1958 since its start in 1956.
- (e) The establishment of a shipyard and a slipway in Gurapin (West Irian) was started in 1958 with a budget of Rp.1,000,000. The engines are provided by ICA to the amount of US\$33,000.
- (f) The establishment of a shipyard and a slipway in Pulau Bayan (Tandjung Pinang, Central Sumatra) was started since 1957. The engines and equipment are provided by ICA to an amount of US\$165,000. An amount of Rp.6 millions has been spent for the construction, which is expected to be finished in 1959.

Establishment of Canneries, Ice-plant, etc.

- (a) *Ice-plant in Tegal (Central Java)*
This plant, which has a capacity of 20 tons a day has been established in 1954/1955 by the Sea Fisheries Service with a budget of Rp.1,620,000, while machinery amounting to US\$50,000 have been obtained from ICA. In 1957 this plant was given the status of a Limited Company with a

capital of Rp.2,108,000 which forms the Government's share. During 1956 and 1957 this plant had profits of, respectively, Rp. 391,989.94 and Rp.482,764.24.

(b) ***Pilot Cannery in Ambon (Moluccas)***

The establishment of this cannery started in 1956 with a budget of Rp.750,000 and machinery amounting to US\$20,000, obtained from ICA. This small cannery has started to produce canned tuna fish. Extension has been planned for 1959.

(c) ***Kotabaru Project***

This project consists of the following establishments:

Fish flour plant; Cannery; Ice plant; Workshop and wharf/slipway; Netloft; Fish drying and fish salting plants; Training Center.

It was started in 1955/1956 to intensify and modernize the fishing efforts of South Kalimantan (Borneo) and environment.

This pilot project is meant to create a modern fishery community which can be used as a sample for the development of other fishery regions. The machinery is supplied by ICA. This project which was expected to be finished in 1958, has met with several obstacles during the establishment, e.g. such as lack of equipment, etc. Experiments on fish canning were started at the end of 1957 with satisfactory results. For supply of fish as raw material,

5 carriers, 9 fishing vessels and 1 shrimp trawler, have been provided.

The total expenditures up to the end of 1958 were as follows:

Capital investment Rp.13,701,000; Exploitation expenditure, Rp.3,913,000; total Rp.17,614,000.

The execution of this project is supported by foreign experts, provided by ICA. It is expected that the whole project will be finished soon.

Fishermen's Organization

Due to the heavy pre-occupation at sea, Indonesian fishermen and their organizations are not able to manage the marketing of their sea products themselves in an orderly way, and they are accordingly compelled to pass this business to others with every confidence and without taking into consideration whether the price of the fish is reasonable or not.

This unfavorable situation can be overcome partly by making joint efforts in the form of cooperatives. It is obvious that a cooperative is the most suitable type of organization for the fishermen, due to the fact that basically the fishing industry itself is a joint effort in Indonesia. Moreover fishery cooperatives will be able to assimilate the technical developments for the sake of their members, by way of rationalization and modernization.

Through the establishments of fishery cooperatives it is strongly hoped that the fishermen will gradually be able to decide what must actually be done with their own products. This can be achieved by way of: setting up fish auc-

tions in the first place; setting up central places for fish salting and efforts for selling the product jointly; marketing the fish directly to the consumers.

Success has just been achieved in the setting up of fish auctions, which

are mostly found along the coast of the island of Java.

Below is a picture of the interinsular transportation of fish and other sea products, with the export and import-figures, according to available data.

	1956		1957		1958	
	tons	Rp.1000	tons	Rp.1000	tons	Rp.1000
1. Interinsular transportation of fish and other sea products	76,992	233,361	77,999	258,392	74,776	288,631
2. Export of fish and other sea products	7,050	21,825	6,317	18,497	4,445	11,410
3. Import of fish and other sea products	35,095	84,784	28,996	69,194	17,632	32,868

Credit Facilities for Fishermen

As is generally known, there are many categories of fishermen in the whole country of which the following groups may be worth considering:

1. The have-not fishermen (not in possession of any kind of fishing vessel and/or gear of significance) e.g.:
 - (a) those, who get fish by merely using more or less primitive, small and personally owned fishing gear like "panching" (fishing rod) and
 - (b) those, who are jointly gathering fish by using one or more fishing vessels and/or gears of significance belonging to others.
2. The haves, e.g. the owners of fishing vessels and/or gears as meant under 1(b), who themselves continuously are working (or during a stretch of time have worked) as fishermen and lead their fishing venture.

The first group is mostly very poor, while the second cannot or can hardly maintain their position as *juragan* (owners) of vessel and/or gear as mentioned under 2 without gaining any assistance.

Every time, before joining a fishing team the fishermen mentioned under 1(b) want advances from their respective *juragans* in the form of money and/or foodstuff, which in amount and/or value vary and depend on several factors. It is understandable that the *juragans* beside these advances also have to incur many other bigger expenses to make their vessels and/or gears ready for use. Thus both group 2 and 1(b) fishermen face the needs of the same nature. This situation gives rise to many practices and the so-called "idjon" system in all its forms, which directly or indirectly paralyses their economic strength from year to year.

To preserve their producing power and to help them to improve their social well-being the Government has taken several steps as to help them in setting up Organizations (cooperatives) and provide credit facilities.

Such assistance already existed during the last period of colonial regime in Indonesia, but with restricted possibilities so that most of the poor fishermen have tended to accept their present poverty with fatalism not realizing that it is possible to better their economic position if they only make good use of the existing credit facilities. It has been necessary for the Government to take the initiative to induce the fisherman to utilize the credit facilities.

The following Institutes, Services and or Agencies are extending/channeling credits to (for) fishermen or to (for) fishing or pearl industries :

I. The Bank Rakjat Indonesia (the Indonesian People's Bank) and the Djawatan Pegadaian Negara (Govt. Pawn Service).

1. The Bank Rakjat Indonesia (as one of Government's Banks) is according to Government's Regulation of April 20, 1951 No. 25 mainly in charge of supplying credits for the so-called "middenstand" (middle class). But in the absence of a more suitable credit institute for fishermen it also extends credits to fishery circles, accepting their houses, lands and/or fishing vessels as collateral security at 10% interest per annum.
2. Besides, they frequently obtain credits from the Djawatan Pegadaian Negara upon delivery of their gold ornaments, etc. (foreign golden coins included),

which they have gathered during a good season. Interest is mostly 12%.

II. The Sea Fisheries and Cooperative Service.

1. Credit in the form of fishing vessels or engines. Starting from 1950 up to now the Central Sea Fisheries Service, with the intention of rationalizing and increasing fish production, allots an amount of about Rp. 10 million from its yearly budget for producing motorized fishing vessels which are to be distributed to fishermen especially as members of cooperative organization under hire-purchase agreement. The Indonesian Federation of Fishery Cooperative (IFFC) and its member organizations are assigned as channeling agencies, which together with the local Sea Fisheries Service are charged with controlling the use and maintenance of the vessels and further collecting of payments. The price of the vessel or engine added with 6% interest must be fully paid within 8 years. Every request from a member(s) or fishery cooperative for obtaining such a vessel or engine needs the approval of both local Sea Fisheries and Cooperative agency. In this case the Central Sea Fisheries Service in Cooperation with the Central Cooperative Service and assisted by the above mentioned IFFC administers the application and further decides whether or not the request must be passed. Applications originating from a fisherman, or a group of fishermen who are non-members of fishery cooperatives must be sent straight

to the Central Sea Fisheries Service through the regional Sea Fisheries Agency. In such a case the former only passes or rejects the application. Now that the prices of imported articles (engines, spare parts included) are increasing considerably and continuously, practical steps must be made by deciding that not every request for obtaining a vessel can be passed completely. In other words, certain applicants only can obtain a complete vessel (including engine) others can only receive the hull of the vessel supplied by the Central Sea Fisheries Service. As for the engine the applicant himself has to buy it (in cash) elsewhere.

2. The Central Cooperative Service likewise extends credits for fishermen starting from 1 January 1958 to the total amount Rp.2 million. These credits, administered by the IFFC, are mostly used for purchase of materials produced either in the country or abroad, which are further to be distributed to the fishermen as members of fishery cooperatives. The Federation has to repay the loan within 4 years at 5% interest.

III. The Jajasan Lembaga Djaminan Kredit (Institute for Credit Guarantee).

This Institute has been set up by a decree of the former Minister of Economic Affairs per 28 February 1956 No. 2.100/M. The Head Office is in Djakarta, while branches are formed in regions where such is needed. The aim is to provide credits for industries which are operating more or less under control

of Government Departments or Agencies, fishery industries included. It often happens that managers (especially if they are fishermen) cannot offer sufficient collateral securities, and ordinarily it would be very difficult for them to obtain credit from a bank. This Institute is meant to help such people to obtain credits from a bank, by guaranteeing the repayment of the loan in case that they might fail in it, provided the controlling Government Service or Agency (after having investigated) approves and supports their request. Such credits, passed upon technical advice and support of Government Department (supervised credits) have been extended since 1952 to the amount of about Rp. 2.5 million channelized through the Central Sea Fisheries Service and administered by the IFFC; only one credit application has been passed (in 1958) to the amount of Rp. 50,000.

As the Institute itself has to borrow from the Bank Rakjat Indonesia at 4% interest per annum and the latter likewise from the Bank of Indonesia at 3% interest, while the Institute itself takes 5%, the applicants have to pay a total of 12% interest per year. The duration of repayment is up to 3 and 6 years respectively for operating expenses and for investments. The payments are to be made monthly or otherwise in conformity with the credit agreement.

IV. The Bank Tani dan Nelayan (Farmers and Fishermen Bank).

In order to achieve more positive results of realizing supervised credits as mentioned in III, the Government has established the

Bank Tani dan Nelajan by an Emergency Bill of 10 August 1957 No. 18, which after slightly being amended has been passed by the Parliament as Bill No. 77/1958 published on 8 October 1958.

The basic issued capital amounting to Rp. 100 million is presently in Government's hands, of which 5% consists of priority shares; the other 95% is gradually to be transferred to Cooperative organizations.

Beside the Head Office (located in Djakarta) the bank has no branches. Its credits are made available either to fishermen or to farmers, farm workers and cattle holders through its channeling agencies, e.g. local and autonomous cooperative organizations, financing corporations, banks, etc., which have been recommended by the Head of the First

and or Second autonomous region. Cooperatives (including their members individually) organized under a central board can obtain credit from the bank through the board concerned.

The rate of interest, 12% per annum seems to be high. But it should be noted, that the bank has presently obtained its capital from another bank (Bank of Indonesia). Besides, it has to transfer the acquired interest in part to its channeling agencies. For the time being it solely provides short term credits (12 months or shorter) for operating expenses.

Up to the end of July 1959, the Bank Tani dan Nelajan (Nelajan Section) has passed credits either to organizations (companies included) or to individuals as shown by the following figures:

(Source: Bank Tani dan Nelajan)

No.	Credit Objects	Organizations Rp.	Individuals Rp.	Total Rp.	Payments Received Rp.	Balance per July 31, 1959 Rp.
1.	Improving fish- ery activities	2,540,000	125,000	2,665,000	1,716,546.29	948,453.71
2.	Preserving fish	1,000,000	—	1,000,000	180,543.—	819,457.—
3.	Marketing	25,000	—	25,000	25,000.—	—
4.	Additional activities	400,000	—	400,000	202,413.50	197,586.50
5.	Purchase of materials	860,000	1,325,920	2,185,920	492,904.—	1,693,016.—
6.	Combatting usury	—	75,000	75,000	12,000.—	63,000.—
		4,825,000	1,525,920	6,350,920	2,629,406.79	3,721,513.21

V. Special credits.

Before the establishment of the Bank Tani dan Nelajan, special credits have even been extended to the amount of each Rp. 5 millions to

fishery as well as to pearl-industry, which are operating respectively around the waters of Atjeh (North Sumatra) and Buton (Southeast Sulawesi).

JAPAN

Survey of Fishermen's Earnings

The Japanese Shizuoka Prefecture Federation of Fishermen's Credit Cooperatives has recently made a survey of the income of 21,097 fishermen's families belonging to 70 cooperative associations in the Prefecture. It found that the average annual income per family was 619,000 yen (US\$1,733), of which 85.2 percent was from fishing and 14.8 percent from other activities, such as farming, home crafts or day labor. Of this gross income, on the average, 51.2 percent was spent for expenses directly related to fishing and 39.2 percent for living expenses. Average expenditures for living expenses per family were 242,000 yen (US\$677), as compared with a figure of 382,000 yen (US\$1,070) found in a recent survey of urban workers' families, but it was believed that fishermen's families receive a considerable unrecorded income in the form of goods. The Shizuoka fisherfolk were found to save on the average 0.6 percent of their income. Shizuoka ranks fourth among the prefectures of Japan in total landings and is the leading prefecture for tuna landings (*Suisan Keizai Shim-bun*, 14 June 1959).

Fish Sausage Demand Reflects Changing Food Habits

Changing food preferences are bringing a boom to the Japanese manufacture of fish sausage and similar products. Figures released by the Japan Fish

Sausage Manufacturers' Association indicate that production of conventional types of fish sausage and "ham" was up to 49,190 metric tons in 1958, as compared with 38,217 metric tons in 1957, and a further increase of at least 20 percent is being predicted for 1959. Since the fall of 1958, the manufacturers have been busy introducing new products, such as "salami," "sliced ham," and "corned beef," and although production statistics seem to be lacking for those exotic items, they are also expected to develop greatly during 1959. The popularity of these handy, relatively imperishable foods is also said to be holding back expansion of demand for fresh fish. A comparison between Japanese consumption of marine products during 1948 and 1958 reflects the change in demand. Taking 1948 consumption as 100, the 1958 indices for the following foods are: fresh fish 112, salted and dried fish 153, refrigerated products 268, and whale meat 460 (*Comm. Fish. Rev.*, July 1959).

North Pacific Salmon and King Crab Fisheries

The catch of salmon and king crab by North Pacific factoryship fleets as of 10 June 1959 is as follows: the salmon catch was 19,700 tons; the Sea of Okhotsk crab pack was 149,359 cases, and the crab pack by the TOKEI MARU fleet in the eastern Bering Sea was 45,769 cases. In all cases, the record was better than last year's. The catch

of 16 salmon fleets by 10 June was about 1,000 metric tons above that of last year at the same time. Water temperatures are much higher than last year, all species show signs of being more abundant, and pink salmon in particular show indications of a regular odd-year high in abundance. The Okhotsk and eastern Bering Sea crab operations had packed by the end of May more crab than at the same time last year by 30,000 cases and 10,000 cases, respectively. Of the 19,700 tons of salmon caught as of 15 June 1959 red salmon totaled 6,195 tons (36.87 percent), chums 10,200 tons (53.76 percent), and pink salmon 1,650 tons (8.91 percent). The average catch per fishing boat was 15.21 tons of reds, 22.17 tons of chums, and 2.67 tons of pinks, for a total of 40.05 tons per boat.

The Japanese-Soviet Fisheries Commission finally decided on a catch quota of 85,000 metric tons of salmon for the Japanese fleets within the treaty area north of 45°N. longitude on 13 May. On 15 May the fleets—16 motherships and 460 fishing boats—sailed for the grounds, and deliveries of fish to the motherships began on 22 May. Reports indicate the general pattern of the catch resembles that of 1957, a high year in the cycle of salmon abundance. Deliveries to the motherships have been running 70 to 100 tons a day, somewhat better than last year, and catch rates are 4 to 6 fish per shackle of net. As of early in June fishing was reportedly concentrated between 165°E. and 171°E., at 46°-47°N. The Japanese Fisheries Agency decided to divide the catch quota between the mothership fleets and the Hokkaido land-based fishery in the same proportion as last year, giving 70,831 tons to the mothership fleets (154 tons

per catcher boat) and 14,169 tons to the land-based boats. Licenses on this basis were formally granted the mothership operators on 26 May, and the fishing boats' licenses were sent off to the grounds on a transport on 27 May. It is reported that Soviet patrol boats are unusually active on the fishing grounds, constantly checking the Japanese catcher boats' gear and the distance between their nets.

Fisheries in Hokkaido Area

Because of a severe decline in various traditional fishing resources in the coastal areas of Hokkaido, a great change has taken place in the Hokkaido fishing industry in postwar years. Between 1929-1944, the bulk of the catch was herring, sardines and anchovy, which abounded in nearby offshore waters. Herring production, which was 500,000 tons in 1933 has shrunk to less than one-tenth of that figure; anchovy production, even greater in some years, has declined to one-twentieth. The fishermen of the Island have been able to support themselves only by going farther out to sea in motorized fishing craft, and concentrating on salmon, salmon-trout, groundfish, squid and mackerel. The total catch of these species is several times larger than in the prewar years. Profitable distant sea-fishing grounds are in the Sea of Okhotsk and near the Soviet-occupied Kurile Islands where, however, Japanese fishermen have been in recent years faced with the problem of seizure and detention by Soviet authorities. Annual negotiations between Japan and the Soviet Union setting restrictions on the catch of salmon, crab and other fish and any future negotiations concerning fishing grounds are of great concern to the Hokkaido fishing population whose

average income is reported to have dropped to 58 percent of the pre-war figure. Hokkaido still produces 26 percent of Japan's total supply of fishery products. Salmon accounts for one-quarter of the value of the catch which, beside varieties mentioned above, includes cod, flatfish, scallop and seaweed. The value of the 1958 production landed in Hokkaido was US\$87 million. (*Comm. Fish. Rev.*, August 1959).

World-Wide Tuna Fishing

Japanese tuna fishing circles in Shimizu are watching with interest the progress of a plan for a year-long, round-the-world tuna fishing trip. The vessel is NO. 5 SEIJU MARU (500 tons gross), which was due to sail in July 1959 with a captain and 30 crew members to fish in the Indian Ocean, the Mediterranean, the Atlantic Ocean, and the eastern Pacific Ocean, and sell the catch at various ports. Principal fishing grounds will be in the Indian Ocean, off the Gold Coast of Africa, and off Brazil in the Atlantic, and, after traversing the Panama Canal, in the Pacific Ocean around the Galapagos Islands. The catches of yellowfin and albacore will be landed in Germany, Yugoslavia and Cristobal in Panama. The SEIJU MARU is the latest type of large tuna longliner, and was planned for operations in distant waters. She carries $1\frac{1}{2}$ times as much fish as older boats of the same tonnage, and has the capacity to freeze 30 tons of tuna per day. The grounds that will be fished by the SEIJU MARU

were surveyed last year by the research vessel SHOYO MARU, of the Japanese Fisheries Agency. The industry is showing deep interest in this bold plan of a privately-owned vessel. The SEIJU MARU is scheduled to return to Japan in July 1960. (*Comm. Fish. Rev.*, Sept. 1959).

Good Tuna Catches

The Japanese pelagic fisheries guidance vessel IWAKI MARU from Fukushima Prefecture has reported on its third trip that at the fishing grounds off the Galapagos Islands ($123^{\circ}18'$ W. long and $6^{\circ}25'$ S. lat.) the first longline set yielded 28 yellowfin and 5 big-eyed tuna, 47 large bonito, 20 broadbill swordfish, and 4 striped and black marline—total weight 5.3 metric tons. Following the first set, catches averaged 5.6-6.5 tons or about twice what was obtained during the vessel's second trip. (*Comm. Fish. Rev.*, July 1959).

Canned Pet Food from Fish Waste

Japanese high-seas salmon packers are planning to pack pet food from waste salmon at their land processing establishments this season. Reports indicate that there is an increasing demand from U.S.A. for Japanese canned pet food. Also, a number of Hokkaido fish canners have now begun to plan packing of pet food from such fish as saury, herring, Atka mackerel, etc., as may be caught locally. The major fishery items canned in Hokkaido are pink salmon, king crab, Kegani crab, Hanasaki crab, saury, squid, scallop clam and whale meat. (*Comm. Fish. Rev.*, July 1959).

KOREA

Shrimp Fisheries

Landings of shrimp in Korea in 1958 amounted to 16,280 tons valued at 746.6 million hwan (US\$1.5 million), a drop of

9,389 tons from the preceding year, but about the same as the average (14,970 tons) for the three-year period 1954-1956. About 70 percent of the landings consist

of shrimp over 440 count to the Kg. (6.4 mm. in length), 20 percent shrimp 220-440 per Kg., and the balance less than 220 shrimp to the Kg. The smallest shrimp are brined and dried for the domestic trade and for export. Only those shrimp of the size 220/Kg. count or less are frozen for export. Exports up to 1958 were practically all dried shrimp, except for some shipments (48 tons in 1954) of fresh shrimp to Japan. Although no data on fresh shrimp shipments have been maintained since 1954, it is believed this small-scale trade continues. The exports of dried shrimp between 1954 and 1958 varied between a high of 318 metric tons in 1957 to a low of 9.5 tons in 1958. In 1958, the first shipments of frozen shrimp were made to the United States, 58.5 tons of frozen shrimp were exported and it is

estimated that shipments through April 1959 totaled 13.6 tons. The development of a frozen shrimp export trade has been aided by the U.S. International Cooperation Administration Mission to Korea. The United States is the only country to which Korea ships frozen shrimp. (*Comm. Fish. Rev.*, September 1959).

Koreans Fish for Tuna Cannery

The first Korean tuna longline vessel to fish for the tuna cannery in American Samoa arrived early in 1958, and a second vessel arrived in September 1958. Six additional Korean vessels were reported to be scheduled to enter this fishery under contract to the tuna cannery. The American Samoa cannery is operated by a United States west coast tuna canning company. (*Comm. Fish. Rev.*, July 1959).

FEDERATION OF MALAYA

The Quarterly Report to the Cabinet for the 3rd quarter 1959 of the Fisheries Department gives the following information:

Fish landings in nearly all parts of Malaya showed the normal seasonal decrease in the 3rd quarter of 1959, compared with the 2nd quarter. The total landings, however, were considerably higher than in the corresponding quarter of 1958, mainly due to exceptionally heavy catches by pukat jerut fleets in Perlis and Kedah. Landings in Selangor and Malacca dropped due to the restrictions on drift net operations off Indonesia. On the East Coast landings decreased in the middle of the quarter because of the exceptionally dry weather and clear water, but later fishing conditions improved and, although landings in Pahang and Kelantan did not reach

the level of the 3rd quarter of 1958, the Trengganu landings were much higher. The estimated landings in Johore show a very considerable increase over the previous quarter and are a major contribution to maintaining the fish production at the higher level. Part of this increase is due to the movement of Malacca driftnet operators to the East Coast as a result of difficulties in operating off the West Coast. The Malacca drift netters have continued to be plagued with piracy as well as by bad weather.

The total landings for the third quarter of 1959 was 519,379 piculs as compared with 573,760 piculs for the corresponding quarter of 1958.

Mechanization

The rate of mechanization in this quarter was almost 30 percent higher

than in the previous quarter, a total of 392 boats being fitted with engines. Johore is well to the fore with a total of 112 new powered boats registered in the quarter, while Selangor has maintained the high rate of progress in modernisation of its fishing fleets. In Selangor 91 new Diesels were fitted and 20 new outboard engines. In Perak, Diesels are at last tending to oust the previously favored outboard engines and the proportion of new Diesels in the total of new engines has risen from approximately 15 percent in the second quarter of 1959 to approximately 30 percent in the third quarter. On the East Coast the rate of mechanization has slowed down following the high rate in the post monsoon period but with 36 new engines fitted in Trengganu, 10 in Kelantan and 6 in Pahang the position is very satisfactory.

Fisheries School

The third Fishermen's Training Course for the year was held from 29 June to 25 September 1959. Fifteen fishermen from various parts of Malaya attended the course. The scope of the course has been extended to include short talks on fishery biology, freshwater fisheries, preservation of fish and cooperative principles in addition to the main studies in helmsmanship and engine maintenance and repair. Of the 15 trainees, 13 passed the Departmental examination in Engine Care and Maintenance and of these 13, all sat and passed the Government 3rd Class Engine Driver's Examination. Nine of the trainees sat for the Marine Department Helmsmanship examination and 4 passed.

Fishermen's Cooperatives

The cooperative organization for transport and distribution of fish on

the East Coast is steadily expanding its handling and in the quarter disposed of 3,491.42 piculs of fresh fish with sales value of M\$119,023.29. In addition, a considerable quantity of dried fish was handled. Loans to member societies during the quarter amounted to M\$15,934.94 for purchase of boats and equipment and M\$9,692.60 for purchase and construction of sheds for curing fish, an aspect of fish production which is being given greater emphasis in the North East.

The Union Ice Factory at Kota Baru is a very definite asset in the North East and is of great benefit to the cooperatives both from the point of view of provision of ice and from its profit making aspect. The proceeds from sales during the quarter amounted to M\$41,647.00 while working expenses were M\$12,463.07. The Cooperatives also profit from the bulk purchase of fuel by the Marketing and Transport Union and fuel to the value of M\$9,435.00 was purchased on favorable terms for sale to member societies.

Plans for distribution of fish by rail from the North East to Kuala Lipis and thence to Kuala Lumpur and other major markets have proved difficult to implement because of the problem of transshipping and onward distribution from Kuala Lipis. All possible distribution channels are being looked into, as far afield as Singapore.

Freshwater Fisheries

During the quarter the following numbers of fish fry of different species were distributed to various parts of the Federation: *Tilapia*, 2,750; *Kalui*, 270; *Lee Koh*, 5,205; *Lampam jawa*, 27,795; *Sepat siam*, 9,378; *Catla catla*, 6,280; Total, 51,678. The *Catla catla* was

imported from India in two consignments and immediately distributed to farmers at cost price. There is a standing demand for these fish which grow quickly to large size but they have not been bred in Malaya and supplies from India are limited. Lampam jawa is well established as the most popular of fish for pond culture and it is now being spawned in several localities so that the farmers can replenish their own stocks and thus ease the burden on the Fry Breeding Station at Tapah. Reports from all areas in which the fish has been introduced speak well of its high survival rate and rapid growth. It is even replacing Chinese carp in the Chendrong area of Perak due to lower initial capital outlay in obtaining fry.

Although Lampam jawa is replacing *Tilapia* as the most popular fish for pond culture, *Tilapia* is still favored by some breeders and is a source of regular income to them. An excellent example of this is Haji Musa of Bandar Bharu who harvests an average of 39 katties of fish per month from a small pond of only 0.04 acres in area. This supplies his own needs and brings him a small profit. The production rate for this pond works out at about 7 tons per acre per year.

A total of 29.66 acres of mining pools and ponds were cleared of predators and prepared for restocking in the quarter. Attention is being switched to Selangor for the clearing and restocking of mining pools and in Central Pahang a number of pools are being earmarked by individuals for use in fish culture.

Two courses in fish culture were held in the quarter. The first was for Malay fish farmers from Kelantan and the second for Chinese from Selangor

and Perak. The courses are of undoubted benefit to the fish farmers as they have shown what can be achieved and how to achieve it. The Department also benefits as the farmers are made aware of the Freshwater Fisheries Staff who are stationed in various areas to help them and having been told of the help available, they give the officers their confidence and both seek their guidance and follow it.

With the help of the Fisheries Department, the Fish Farmers Cooperative Society in Ipoh have been allotted two stalls in Ipoh New Town Market and have been selling their Chinese carp direct to the public. Prior to being granted the stalls, the fish farmers were forced to sell to dealers at dealer's prices, resulting in little or no profit to the farmers and higher prices to the consumers.

Experimental Fishing

Mr. Momokawa, the Colombo Plan Expert, carried out a widespread series of experiments off the East Coast on the use of bottom longlines, tuna longlines and blanket-net with lights. The final results of the experiments have not yet been compiled.

In Kelantan and Trengganu synthetic fiber netting is gradually becoming more popular, particularly for drift nets. The Fisheries Department has purchased an experimental Pukat Dalan made of the Japanese synthetic fiber, Tavilon and this has been loaned to a group of operators at Kual Ibai, Trengganu in order to determine the advantages in the use of this type of netting. The net has been successful to date and has attracted a considerable amount of attention. A full report will be compiled when sufficient

data is available for a well-founded estimate of its worth. Pukat Tangkol units off Trengganu have been making good catches near islands without the use of the traditional "Unjangs".

Research

Cockle Culture. Routine examination of cockles for gonad development have continued but on a more detailed basis. Regular sampling for salinity and plankton determinations have been carried out and soil analyses have been made for particle size and carbon content. Cockle "spat" were found in mud samples taken in late June.

Hydrology. Water samples from fish ponds at Bayan Lepas have been regularly analysed. Salinity determinations have been continued from samples taken from Malacca Straits and Penang Island. These determinations have been continued for 18 months and will continue until at least April 1960 in order to complete a two year cycle from which it may be possible to get some idea of the salinity pattern in the Northern part of the Malacca Straits.

Food Technology: The Food Technology section is looking into another important food commodity, namely, salt fish, its grading and storage. It has been estimated that more than half the annual catch of fresh fish finds its way to the consumer in the salted form. Almost without exception, the arrangements for the production of salt fish throughout the whole of Malaya are quite primitive. The fish are practically sun and wind dried—a process which accelerates decomposition and spoilage in humid conditions. The Director of Fisheries has now initiated a survey into the salt fish industry of Malaya and has drawn up a program to

look into the possibilities of grading the salt fish and to find the optimum conditions under which they can be stored.

The estimation of total volatile nitrogen has been generally used as an index of the degree of spoilage of fish samples. Indian workers have pointed that the total volatile nitrogen content gives a better index of spoilage of cured fish products than the trimethylamine content. Working on these lines, the Food Technology section is carrying out experiments on the popular varieties of salt fish with the possibility of grading them. Samples from various parts of the country are being analysed in the laboratory and a complete report is being made to help the salt fish industry.

Storage facilities are still far from satisfactory and most of the cold rooms in use built for the purpose of keeping vegetables, fruits, fresh fish in the past are now also used for storing salt fish. The Food Technology section has therefore initiated a research as to what are the optimum conditions that are necessary to prolong the keeping qualities of salt fish, in cold storage.

Freshwater Fisheries: Identification of plankton and plankton counts were carried out at Bayan Lepas in continuation of routine examination. Under the direction of Dr. S.W. Ling, experiments on the breeding of the giant freshwater prawn (*Macrobrachium carcinus*) and on induced spawning of fish by the use of Pituitrin injections have been initiated. In the latter experiment spawning has been induced in Lampam jawa but difficulties in rearing the young fish under artificial conditions have yet to be overcome.

General

Guiding lights for fishermen are being provided at various fishing villages in the Federation. New oil lamps have been provided at two villages in Penang and the structures for housing of flashing lights are nearing completion at Yen, Kedah and Tanjong Piandang, Perak.

Preparations are being made for erection of lights at Setiu, Paka and Kerteh, Trengganu. Work at the new fry Breeding and Distribution Station, Kuala Kangsar is proceeding satisfactorily. Six large ponds have been excavated, drains cut and a field laboratory is shortly to be constructed.

PAKISTAN

Tilapia from Thailand

Fish from Thailand, now being cultured in East Pakistan, are helping to cope with the problem of food shortage. *Tilapia* was introduced into East Pakistan in 1954 when 196 young *Tilapia* were flown in polythene bags from Bangkok. Since that date, 1,032,288 fish have been produced in the Government nurseries in various districts. Out of these 241,500 have been introduced in open water near Dacca. Recently 3,000 young *Tilapia* were introduced in the tanks of the Government House.

Freezing and Processing Plants

Only two firms, both located in Karachi, are now engaged in the export of frozen and canned shrimp. One firm maintains a plant having a freezing capacity of 4½ tons daily, and cold-storage facilities of 40 tons capacity. The other firm has a freezing capacity of 6 tons daily, and cold-storage facilities of 1,250 tons capacity. Two additional plants, both in Karachi, are scheduled for completion in January 1960. The Bay of Bengal in East Pakistan reportedly offers an excellent potential for the development of a fishing industry. No freezing and cold-storage plants are operating in East Pakistan at present; however, two are under construction. The first, located at Chalna,

will have a freezing capacity of 5 tons daily, and cold-storage facilities of 200 tons capacity. The second, at Chittagong, will be able to freeze 2½ tons daily and store 50 tons. (*Comm. Fish. Rev.*, Sept. 1959).

Import of Fishing Equipment

The Pakistan Central Board of Revenue with the sanction of the Central Government announced the exemption of certain fishing requisites from Customs duty and sales tax if imported through the Karachi Fishermen's Cooperative Purchase and Sale Society, Ltd., Karachi; and in the case of East Pakistan if imported through the Director of Fisheries, East Pakistan. The ad valorem rates of duty normally charged for some of these items (all subject to a ten percent sales tax in addition to duty) are: marine Diesels and spare parts, 10 percent; nylon ropes, 30 percent; nylon twine, 37½ percent; coir ropes, 36 percent; fish hooks, 80 percent; Spongex floats, 60 percent (from U.K., 50 percent); navigational instruments, 60 percent (from U.K., 50 percent); and lead sinkers, 40 percent. The Central Board of Revenue, Ministry of Finance, stated that although no official notification regarding exemption from Customs duty on the above items has been issued, executive instructions setting forth the

procedures for granting the exemptions have been forwarded to the Customs authorities. (*Comm. Fish. Rev.*, Sept. 1959).

Shark Liver Oil

A new technique for processing and refining of shark liver oil and preparation of its vitamin 'A' concentrate has been evolved. By application of this new technique it has been possible to transfer the vitamin content of shark liver oil to any vegetable oil of choice. Sharks available in tropical waters usually yield a liver oil having a high melting point with the result that a major portion of the oil remains solid and by wintering at temperatures ranging between 20° to 22°C, a very small quantity of liquid oil could be obtained. This results in a loss of a greater portion of vitamin 'A' with the solid portion of the out-put. This was a major set-back in shark liver oil Industry. By following this new method of processing it has been possible to utilize the entire vitamin 'A' content of the crude oil and fix the potency of the produce at any desired level. During the period under report 1,814 Kg. of shark liver oil were produced.

Dry Fish

A simple and inexpensive method for preparation of sun-dried fish has been worked out. Demonstration units in various places are being set up to educate the people in the trade. It has been suggested that a few cool-chambers may be established for better storage and to prolong the keeping quality of dry fish specially in humid season.

Fish Meal and Manure

Fish scales, bones and fish wastes were collected from the fish curing yards

from different places of this province. These were dried and ground to powder in a grinding machine. During the period under report 35 tons of fish manure and 29 tons of fish meal were produced and supplied to the Agriculture and Animal Husbandry Directorates.

Fish Flour

Samples of good quality fish flour were prepared. Fish flour can be used in making bread, cakes and can be added to other food stuff. The proposition thus offered the possibilities of making the diet rich with valuable animal-protein. Fish flour has a long storage life in a sealed container. Commercial preparation of fish flour thus solves various problems connected with preservation and transport of this perishable commodity.

Preservation of Prawns

A special treatment was given to prawns in order to prolong the keeping period. After removal of heads prawns were boiled for half an hour in 3% salt solution. Water was allowed to drain and they were spread on bamboo mats and exposed to sun for drying. Drying continued till the water content of the product reduced to about 35%. Semi-dried prawns thus prepared were smoked for half an hour in a smoke chamber. Further investigations are being pursued.

Preservation of Hilsa

Hilsa being an oily fish was found unsuitable for sun-drying. Experiments on the preparation of salted *Hilsa* were conducted and the keeping qualities of the specimens are being studied.

PHILIPPINES

Fishery Trainees under Colombo Plan

Two members of the Marine Fisheries Division of the Bureau of Fisheries had been selected as fishery trainees to undergo theoretical and practical training in Japan under the Colombo Plan for a period of one year. They arrived in Japan last May. They will train in the different methods of fish capture in selected fishing regions. The schedule is as follows: July 24 to 31—Visit Chiba Prefecture Government Office and then proceed to Tateyama Fishing Ports for observation. August 11 to 23—In Aichi Prefecture, for practice and observation in raising and hauling nets. September 7 to 17—At Niigata Fishing Ports, for practical training in the operation of small trawl boat. September 20 to 21—At Miyagi Prefecture for training in the operation of medium boat trawl. October 5 to 14—At Shizuoka Prefecture (Hokkawa and Matori), training in set net fisheries and pole and line fishing. This will be the last phase of the practical training. They will also undertake the theoretical phase of their training at the Tokai Regional Fisheries Research Laboratory in Tokyo.

Mr. Adolfo M. Aldana, Chief, Fish Stocking Section, Inland Fisheries Division, Bureau of Fisheries, left on 30 July 1959 for study and training at the Inland Fisheries Research Station at Calcutta, India. He is a scholar under the Technical Cooperation Scheme of the Colombo Plan and will stay abroad for one year.

Antonio B. Baltazar of the Bureau of Fisheries left recently for India to undergo training in fisheries technology in the Central Technological Research Station, Cochin, Kerala, India, and work under the Superintending Engineer, Deep

Sea Fishing Station, Bombay, in the maintenance of engines as a Colombo Plan grantee.

Three members of the staff of the Fisheries Research Division, Bureau of Fisheries, were granted scholarships under the Colombo Plan on Taxonomy, Fisheries Biology and Planktonology early this year. These are Miss Lina Manalac, Mr. Jose Ordonez and Mr. Ernesto Bernabe, respectively. They are training under different fisheries laboratories in the United Kingdom, among them the Lowestoft Fisheries Laboratory and the Marine Laboratory in Aberdeen, Scotland.

Intensified Fish Stocking

The intensive fish stocking activities of the Inland Fisheries Division of the Bureau of Fisheries started in 1957 began to show great results early this year when fishermen from Laguna de Bay caught large numbers of bangos (*Chanos chanos*) ranging from 40 to 73 cm. in length. The larger ones were part of stocks of fingerlings planted in December 1957, while the smaller ones belong to the January 1959 stocks. Previous to 1957, no bangos were ever caught within the Bay, the common fish catch being composed of catfish, therefore, a significant step forward in the increased fish production program of the country.

German Government Scholarship in Fisheries Biology

Mr. Antonio Mines, Assistant Fishery Technician connected with the marine fisheries biological research project of the Bureau of Fisheries was awarded a one-year scholarship for

training in Fisheries Biology and Oceanography by the Government of the Federal Republic of Germany. He has undergone training in various phases of the work, staying at different marine laboratories in Germany and in various research vessels.

Fisheries College Recipient of Research Vessel

The College of Fisheries, University of the Philippines, has been designated as recipient of a 100-ton research vessel from the Reparations Program with

Japan. This boat is now under construction in one of Japan's many shipyards and will be ready for formal turnover in December of this year.

Alexander von Humboldt Stiftung Scholarship

Miss Elvira Tan, Biological Chemist of the Fisheries Research Division, has been granted an Alexander von Humboldt Stiftung scholarship of the Federal Republic of Germany in Fisheries Biology and Physiology. She is presently enrolled in the University of Kiel where she will stay for a year.

UNITED KINGDOM

HONG KONG

The Quarterly Report, July–September 1959 of the Cooperative Development Department gives the following information:

Fish Marketing Organization

Weather conditions throughout the quarter were generally favorable for fishing operations, but with the advent of the slack season for trawlers and liners, which occurs in the third quarter of each year, a reduction in quantities of fresh marine fish landed is normally expected at this time of the year. Landings of fresh fish from deep sea trawlers registered a marked decline in comparison with the preceding quarter. However, main season landings from purse seiners, and continued satisfactory landings from liners, maintained the overall landings for the quarter at an acceptable level. The total of 182,734 piculs landed was only 2.54% below the total for the preceding quarter, and represented an increase of 42.39% in comparison with landings during the

corresponding quarter last year. The total quantity of salt dried marine fish sold through the Aberdeen Wholesale Fish Market amounted to 18,044 piculs. This represents a decrease of 23.90% in comparison with quantities marketed during the preceding quarter and an increase of 30% over total quantities marketed during the corresponding period in 1958.

Despite decreased landings of fresh marine fish the average wholesale price per picul declined by 8.45% from the preceding quarter's average price to \$65.00 per picul. This was due mainly to the changing varieties of fish landed and to some slight increases in the quantity of imported pond fish available in the Colony. The average wholesale price of salt dried marine fish on the other hand increased by 4.65% over the second quarter's average wholesale price as a result of reduced production, and the average price for the period under review was recorded at \$45.00 per picul.

Education

The total number of fishermen's children receiving education on the aid of the Fish Marketing Organization at the end of the quarter was 2,217. Out of this number 1,381 were pupils of Fish Marketing Organization schools. There were also 865 children attending other Fishermen's children's schools which receive administrative advice from the Organization but are not financed by it. During the quarter, the building of two new fishermen's children's schools was completed. The first was at Tai O and lessons were commenced in the new premises on 2 July. The total cost of the school was some HK\$86,420 and this cost was borne mainly by the Fish Marketing Organization and Education Department. A sum of HK\$2,799 was subscribed by local fishermen towards the cost of the school and Mr. Tsang Yung, proprietor of the Blue Taxi Company Limited generously donated HK\$10,000. The second school was the Stanley Fishermen's Children's School which was opened on 17 August. The actual cost of this school has not been calculated yet as the school is combined with a fish receiving depot. However, the total estimated cost is approximately HK\$70,000. The Adult Class for Fishermen held in the afternoons at Shaukiwan Fishermen's Children's School continued during the quarter with a total of 20 fishermen studying Chinese, Social Studies, Letter Writing, Arithmetic and English.

The Quarterly Reports for April/June 1959 and July/September 1959 give the following information :

Fishing Operations

During April-June 1959, the weather was mostly favorable to the fishing junks.

The gentle and moderate South-east breezes often prevailed in April and May and the gentle south-west breezes in June. Although there was one typhoon centred in the south of Yap in April, it did not affect the activity of the local fishing junks. Heavy rainstorms during 12th to 15th June caused no damage to fishing junks except the inshore junks, such as purse seiners, shrimp trawlers and small liners, suffered from the loss of fishing days. Nine pairs of company operated trawlers and one otter trawler owned by the local fishing companies were operated in the fishing grounds near Gulf of Tong King, south-west of Taya Island and South of St. John Island. The catch averaged well except for the otter trawler, which was converted from one of the pair trawlers. Mechanized deep sea trawlers had good harvests in the first half of the quarter but the catch reduced considerably towards the end of June. Fortunately, fish prices were good, so business remained profitable. Fishing grounds were from the east coast of Lema Island to Ping Hoi in the 110-146 m. depth. Sail deep sea trawlers had a slack season, and their catches were low in April and May. Most stopped fishing in June and stayed in harbor to repair their fishing gear. Fishing grounds were to the south of Lema Island in the 60 to 70 m. depth. Mechanized deep sea longliners had good catches of golden thread and househead. Fishing grounds were on the east, south-east and south of Ping Hoi or Chilong at 100 m. depth. Mechanized inshore trawlers had good catches of white pomfret, croakers, headgrunt and white herring which brought good prices. Sailing junks, being affected by the unfavorable winds only did fair. Inshore longliners fished off the Nine Pin Islands and South of Lema Island at 46 to 64 m. depths for golden thread, mackerel, white herring,

threadfin and pomfret with satisfactory results. Those working the waters off Lema Island and Ladrone Island at 36-47 m. for conger pike had only fair returns. It was the main season for shrimp trawlers in the quarter, and their catches were good in April and fair in May and June. The fishing season for purse seiners showed no improvement, catches being low in April and May. Although a large quantity of Carangids appeared later in June, it could not compensate for losses in the previous two months. The Pa Teng fishermen did no purse seine fishing, as they were prohibited to use dynamite. Instead they changed to use longlines, gill nets and shrimp nets for fishing around the waters between Lema Island and Ladrone Island at 46 to 55 m.; and on the south-east and south of Ping Hoi at 100 m.; results were fairly good. Gill netters had good catches in the first half of the quarter, mackerel, threadfin and white herring being in season. Catches reduced gradually after May due to these fishes going out of season.

During July-September 1959, the mechanized deep sea trawlers had poor catches of bottom fishes in the areas south of Tuuiang to south of Lema Islands at depths ranging from 100 to 116 m. Some of these trawlers changed to fishing in the inshore waters in August and September for snappers, headgrunts and crevalles where catches were better. These fishing grounds were near the Ladrone Islands at about 33 to 40 m., and south of Pei Chien at about 42 to 46 m. The catches for deep sea longliners were fair; their fishing grounds were off Lema Island at 100 to 110 m., west of Ladrone Island at 91 to 110 m. and off Swabue at 88 to 97 m. Mechanized inshore trawlers had very good catches. The yield of squid was plentiful and the

catch of hairtail was also high. Fishing grounds were from Lema Island to Ladrone Island at 33 to 51 m. This was the main season for shrimp trawlers, which had low catches in July but very good catches in August and September. Purse Seiners were very active in the inshore waters. In July, they fished for golden sardine, green pilchard and gizzard shad with fair results. In August and September they fished for long jawed herring, anchovies, squid, slipmouth pouter, Carangid fish and green pilchard and had good catches.

Fishing Methods and Gear

A 165 m. purse seine was made during the quarter. This net is designed for catching anchovy, carangid and golden sardine and should replace the present small nets used by purse seiners. Synthetic floats were used to replace the local "Leung Chat", (the float made from roots of *Kandelia Rheedii* Wight et Arn.). Two cotton shrimp nets were treated with cutch as a demonstration comparing cutch with "Shu Leung" dye, and it was noted that the new process was simple, saved time, and was cheaper than the original process.

Mechanization and Building

During April/June 1959, 88 vessels, mostly small shrimp trawlers and small longliners, were mechanized and 27 vessels either reverted to sailing junks or to motor trading vessels. No mechanization loans were issued during this period; 45 newly built mechanized fishing boats were licensed by the Marine Department. These were chiefly shrimp trawlers and small longliners. There were 44 built in local junkyards and one in China. The estimated capacity of these 45 vessels was 15,628 piculs, total horse-power of

engines, 1,164.5 and the cost of wooden hulls HK\$272,250. The steam chest for bending of timber for junk building was on loan to Shing Loong Junkyard, Cheung Chau, for demonstration and practical purposes in April, and transferred to Wing On Shing Shipyard, Cheung Sha Wan in June. Local shipyards welcomed this device.

During the July/September 1959, 148 vessels, mostly small longliners and gillnetters, were mechanized; and 32 vessels either converted to sailing junks or to motor trading vessels. The total number of mechanized vessels with the fishing fleet is 2,536. Licenses were issued to 72 newly built mechanized fishing boats by the Marine Department, and these were principally small longliners and gillnetters. Apart from one built in Macau and one in China the rest of these boats were built in local junk yards. The estimated capacity of these 72 vessels was 17,744 piculs, the total horse-power of engines 1,457.5 and the cost of wooden hulls HK\$225,093.

Training of Fishermen

Eighteen fishermen trained by the Department obtained certificates of competency as coxswains; 9 candidates from Engineering classes passed the Marine Department examination and are now qualified fishermen engineers. Nine fishermen joined the 9th Skipper Class, which commenced on 27 April, and navigation training continues. Demonstrations and lectures on the cutting of machine-made sheet net and sewing to form shrimp nets were given to 36 fishermen at Aberdeen Fisheries Office.

Pond Fish Culture

Due to the heavy rainfall during April/June 1959, all fish ponds in the

New Territories obtained adequate water for the stocking of new fish fry. Over 1,500 piculs of fish were harvested from local ponds as compared with 1,000 piculs for the corresponding quarter of last year. The daily supply of pond fish from China varied between 250-300 piculs; but occasionally fluctuated very much, dropping as low as 100 piculs and increasing to as much as 600 piculs on occasion. This was due to the abnormal supply of pond fish resulting from many fish ponds in South China being forced to harvest due to floods. Prices were somewhat the same as the previous quarter except in the periods of severe fluctuation. Two new fish ponds of 20 dou chung ($3\frac{1}{3}$ acres) were constructed, bringing the total area now used for fish culture to 3,362 $\frac{1}{2}$ dou chung (560.41 acres).

Over 3,000 piculs of fish were harvested from local ponds during July/September 1959 with 1,500 piculs for the corresponding quarter of last year. The daily supply of pond fish from China varied from between 250 to 350 piculs. Fish prices became more normal and were about 5% cheaper than during the previous quarter. One new fish pond of 15 dou chung ($2\frac{1}{2}$ acres) was constructed bringing the total area used up to September 1959 for fish culture to 3,377 $\frac{1}{2}$ dou chung (562.91 acres).

Fish Fry Trade

No restrictions were imposed by the Chinese Mainland Government on the export of fish fry from China, other than the limitation of 15 million fry for the year 1959, in the approximate proportion of 1:2:3 for bighead, grass carp and silver carp, divided among the three main fish fry exporters. Only two shipments of 951,000 fish fry were imported from China including 11,000 bighead, 110,000

silver carp and 830,000 grass carp. These fish fry were sold to local fish ponds and no fish fry were exported during April/June 1959.

During July/September 1959, 8,959,000 fry were imported into Hong Kong, including 339,000 big head, 4,670,000 silver carp and 3,950,000 grass carp; 4,658,400 fry of the three varieties of Chinese carp were re-exported to Singapore, Labuan, (British North Borneo) and Taiwan. Over 200,000 fry were sold to stock local fish ponds.

Certificates of Origin

A total quantity of 531,004 catties

of fresh oyster meat was harvested from the Deep Bay Beds. This fresh oyster meat was processed into dried oyster and oyster juice. Certificates of origin for 11,325 catties of dried oyster and 38,759 catties of oyster juice were issued; 60,000 catties of fresh and 44,966 catties of dried oyster meat and 10,000 catties of oyster juice were consumed on the local market. Products certified by the Department for export were 3,951 catties of silver shrimp, used for making shrimp sauce and paste; and 8,432.75 catties of prawns, for making shrimp slices and noodles.

UNITED STATES OF AMERICA

HAWAII

The *News Notes* on scientific activities of the Honolulu Biological Laboratory, August and September 1959, give the following information:

Bait

One of the factors limiting the total landings of skipjack at the Honolulu Cannery is the availability of live bait. Nehu, a local anchovy, is the principal such bait and is frequently in short supply. Also, nehu are difficult to keep alive in the bait wells, thus further limiting the available supply and limiting the distance and time of operation of the sampans. The Honolulu Biological Laboratory (HBL) is presently engaged in studies directed towards both supplementing the live bait supply available to the Hawaiian skipjack fleet and developing a more hardy bait. Three species are presently under investigation, *Tilapia* (*Tilapia mossambica*), Marquesan sardine (*Harengula vittata*), and threadfin shad (*Dorosoma petenensis*).

The *Tilapia* studies are approaching completion. The results of these studies indicate that these fish can be economically reared in ponds; that they may be readily acclimatized from fresh to sea water; that early spawning may be induced, thus making adequate supplies of the bait available to the fishermen at the onset of the skipjack season; that they are a hardy fish and can be carried in the bait wells for several days or weeks through oceanic areas with changes of temperature of at least 10° F. and that, when properly used, they are a good bait for large skipjack. The results of these HBL *Tilapia* investigations were one factor in the State Legislature appropriating \$130,000 for the construction and \$50,000 for maintenance of a *Tilapia* rearing facility by the State Department of Fish and Game.

During an HBL survey of the fishery potentials of the waters of French Oceania, the Marquesan sardine was used

exclusively as bait during live bait fishing for skipjack and yellowfin. Because of its proven qualities, a program of introduction of this fish into Hawaiian waters was started in 1956. All introduction were made in waters near the Island of Oahu. By 1959, as indicated by recoveries made by commercial fishermen during baiting operations, these fish had moved to waters near at least seven of the eight major islands. For use by the fishermen, jars with formalin and labels have been left at strategic points on the Islands. A particularly interesting collection was made in Kaneohe Bay in early August. One of the sardines in this collection was the largest (15.5 cm.) seen by the HBL biologists—larger than any reported from the waters of either French Oceania or Hawaii. In addition, further evidence of successful spawning was given by the presence of 6 cm. sardines in this collection.

During 1959, a small shipment of threadfin shad was introduced into reservoirs. This potential live bait, native to Tennessee and now well established in lower Colorado River watershed, spawns in fresh water but is readily acclimatized to sea water. On 27 August 1959, a shipment of approximately 3,500 threadfin shad was received in Honolulu. These fish were collected in southern California and transported to Hawaii. Shipped in sea water, the fish were acclimatized to pure fresh water upon arrival and then planted in various reservoirs on the Islands of Oahu, Kauai, and Maui and in tanks at the HBL. The latter fish are to be used as a stockpile in case of failure of some of the other plants. Although apparently not as hardy as either the *Tilapia* or Marquesan sardines, only a few shad were lost

during transport and handling of the August shipment.

Although nehu will undoubtedly be the primary live bait used by the Hawaiian skipjack fleet for some time to come, it is anticipated that one or more of the above-mentioned potential baits will be used to supplement the inadequate supply of nehu—particularly during those periods when "season" fish are available to the fleet and, either because of exploitation or lack of availability due to natural causes, the nehu are in short supply. Dependent upon relative superiority as live bait and associated economics, one or more of these three species (or others as yet not considered) may supplant nehu as the principal bait used by the Hawaii skipjack fishery.

Skipjack Behavior

The research vessel CHARLES H. GILBERT returned to Honolulu on 3 September after a 60-day cruise devoted to the study of skipjack tuna behavior. The ship operated around the main Hawaiian Islands except for a two-week period in which French Frigate Shoal was visited.

A new blister-type underwater observation chamber on the GILBERT was used. From this vantage point 3.2 m. beneath the surface, observers watched tuna activity during fishing. They recorded fish behavior on movie film and personal impressions on voice records. The blister was an outstanding success, for not only was it free from annoying bubbles, which limited the use of previous chambers, but its spaciousness enabled biologists to observe tuna behavior for several hours in reasonable comfort. The new blister was superior to underwater television as a device for studying tuna behavior. Although the

television camera occasionally "saw" farther through the water than the human eye or a movie camera, its adjustment and operation were too delicate for the rugged conditions normally prevailing during tuna fishing.

The chief cruise objective was to study the behavior of tuna, with the long-term goal of using the knowledge obtained to increase the ease with which fishermen catch these fish. Nearly all of the summer's research was devoted to skipjack, a small tuna locally known as aku. The reactions of aku were noted when various kinds of bait were used, when baits were "pepped up" with enhancers such as glittering tinsel and water sprays, when the amount of bait was varied, and when colored dyes and various sounds were introduced into the

water. Although the results of these experiments will only be known in detail after weeks of analysis, it is hoped that it will be ultimately discovered what it is that makes a good bait, and also how this bait should be used. Because certain experiments could not be conducted on the high seas, 73 skipjack were placed in the vessel's livewells, and 37 of these were later transferred to a salt-water swimming pool at the Bureau's Kewalo laboratory. Because skipjack were excitable, tranquilizing drugs were used experimentally on some fish. Inoculation was effective in quieting the fish. It also helped to have a docile kawakawa, another small tuna, already in the pond when the aku were added. A seal and turtle census was also conducted at French Frigate Shoal.

VIETNAM

Landings: Although no official statistics on the landings of fish and shellfish are available, foreign fishery experts stationed in Vietnam estimate the 1958 landings to be close to 110,000 metric tons of marine fish and shellfish and 30,000 tons of fresh water fish and shellfish. These totals do not include subsistence fishing or fish and shellfish consumed locally, but include only the landings that enter the larger markets. It is estimated that the subsistence fishery catch equals the commercial catch. It is probable that the commercial catch in 1959 will be larger than in 1958, and that in 1960 it will be much larger. At present the fisheries off the coast of Viet-Nam are relatively unexploited. But now, owing largely to U.S. technical and financial assistance, difficulties of transportation and pre-

servation are being overcome. New fish landing stages have been built or are nearing completion, and a satisfactory method of motorizing small bamboo fishing boats has been devised. Production from fresh water or brackish fish-rearing ponds is steadily increasing. Due to improvement of highways, fresh sea fish are being sold in localities in the highlands which in the past had to depend on salted or canned fish.

Imports: Fish and shellfish imported into Viet-Nam in 1958 amounted to about 2,450 tons, valued at US\$430,000 (at official rate of exchange VN\$35 to US\$). Imports were practically all from Cambodia (1,950 tons, valued at US\$252,500) and Japan (500 tons, valued at US\$167,500). The principal items imported were, 726 tons of fresh pond or river

fish and 1,225 tons of salted, dried, or smoked fresh water fish from Cambodia; and about 500 tons of mollusks from Japan. Imports from countries other than Cambodia and Japan totaled only about 16.8 tons.

Exports: Exports of fish and shellfish in 1958 totaled 408 tons. Only 1180 Kg. were exported to the U.S.A. in 1958. Prospects for future exports of fishery products are improving. Exports to Singapore in 1958 were about double those for 1957. With the establishment of a shrimp-processing plant at Saigon, it is likely that exports of shrimp to the U.S.A. will become important. As an incentive to exporters, a subsidy of 37 percent by value is made by making the effective rate of exchange to exporters VN\$48 to the US\$1. (*Comm. Fish. Rev.*, September 1959).

New Shrimp Freezing Plant: A Vietnamese shrimp fishing company has its

new shrimp-freezing plant about completed and production was due to start in July 1959. The plant is located on a waterway (Arroya Chinois) in the center of the Saigon area. Shrimp caught off the southern coast of Vietnam will be cleaned, quick-frozen, and packaged in wax cartons for shipment to San Francisco, U.S.A. Processing should take only one hour. Arrangements have been made to use a Danish refrigerator ship. Initial production is scheduled to 272 tons a month. The shrimp plant operators are expecting a price of about US\$1.54/Kg. at San Francisco, indicating a gross revenue of US\$420,000 a month foreign exchange, less ocean freight. The freezing plant benefited by at least US\$50,000 worth of foreign exchange under the Commercial Import Program. Shrimp are plentiful; it is believed that this venture has real potential as a most useful foreign exchange earner. (*Comm. Fish. Rev.*, September 1959).

FAO ACTIVITIES

Director-General

The tenure of office of Dr. B.R. Sen (India), Director-General of FAO, has been extended by another four years until 1963.

FAO Conference

The Technical Committee on Fisheries set up by the Tenth Session of the FAO Conference approved the proposed program of work of the Fisheries Division and emphasized the necessity of providing adequate resources

to enable the Fisheries Division to meet more fully the increasing demands by Member Governments. The Conference commended the holding of experts meeting in various fishery fields. The publication of *Current Bibliography of Aquatic Sciences and Fisheries* in a printed form has been approved. A Symposium on Fish Culture as well as a meeting on *Hilsa* is also proposed, provided funds are available. Further regional fishery studies such as that on the Mekong River Basin

are recommended. The Conference requested the Director-General to study the possibility of organizing a Symposium on the Nutritive Value of Fishery Products. Continuation of publication of *World Fisheries Abstracts* and the *Yearbook of Fishery Statistics* has been approved. The holding of a Seminar in Fish Marketing in the Indo-Pacific Region is recommended. As regards the future trends of the fishery programs of FAO, the Conference made the following suggestions to the Director-General: (1) Greater emphasis is to be placed on institutional and structural aspects of fisheries generally, (2) Work should be intensified in the field of fish marketing and distribution, cooperative and productivity of the marine and inland fisheries, (3) Appraisal of resources, (4) Forecast by continents of trends of output over ensuing ten years, (5) Freedom from Hunger Campaign and increased fish consumption.

Staff Movements

Dr. Erik Heen, Chief, Technology Branch, Fisheries Division, visited India, Ceylon, Thailand, Indonesia and Philippines to make a first hand study of the specific methods of handling, processing, distribution and marketing fish in these countries. He also discussed with the Government officials in the Philippines, the forthcoming FAO/IPFC Training Center in fish curing in Humid Tropics proposed to be held at Manila during January/March 1961.

Technical Assistance

Vladimir Matveevich Naumov, a member of the U.S.S.R. Research In-

stitute of Marine Fisheries and Oceanography, has arrived in India on an assignment as an FAO/ETAP marine fishery biologist. His principal work will be to advise the Indian Government on exploratory fishing in the Bay of Bengal and to assist in carrying out a survey of demersal stocks in the Bay and in adjacent waters. The work which Mr. Naumov will do will be in addition to, and will supplement, the work carried out by a number of FAO fisheries experts in India during the past few years. Mr. Naumov has extensive experience as a biologist. He has been senior scientific worker in the Laboratory of Resources in the U.S.S.R. Research Institute of Marine Fisheries and Oceanography and has taken part in research cruises in the Black Sea and elsewhere. He has been chiefly concerned with studying the biological aspects of fish preservation and in establishing patterns to be followed in fishery investigations. He has also been engaged on technical assistance work in the development of fisheries in Bulgaria and Poland. Among the 31 scientific works Mr. Naumov has published are: "Cod of the Baltic Sea", "Soviet-Finnish Oceanographic and Biological Investigations in the Baltic Sea", "New Fishing Areas in the Black Sea" and "Development of Eel-Fisheries".

Mr. Skapti Jonsson arrived in Rome on 25 August 1959 after taking home leave in Reykjavik, Iceland. He left Rome for Bombay on 29 August. Mr. Jonsson has been on assignment in India since February 1957 as FAO/TA Fishery Engineer, working in Bombay State and Orissa State. His terms of reference

are: "to assist the Government in implementing a program for the expansion and improvement of marine fish production, with particular regard to the use of small fishing craft through such measures as (a) the improvement of existing indigenous craft and gear; (b) the introduction of gear of foreign design; (c) the training of local fishermen in the use of such gear as referred to above". During his stay at Headquarters, Mr. Jonsson had technical discussions regarding his future activities in India.

Mr. Erik Estlander (Finland) arrived in Ceylon after briefing at Rome prior to taking up an assignment as FAO/ETAP Boat Builder to the Government of Ceylon. Mr. Estlander's terms of reference are: "To introduce better practices in fishing boat construction and make boat designs in connection with related FAO/ETAP work on small craft mechanization and gear technology". On the way to Ceylon, Mr. Estlander made a brief stop-over of about 10 days in Cochin, India, in order to become acquainted with the FAO/TA program there on fishing boats, and to get further briefing from Mr. Peter Gurtner, FAO/TA Naval Architect in India.

Fellowships

Mrs. Priscilla Caces Borja, Ichthyologist, Division of Fisheries Research of Philippines Bureau of Fisheries, has been awarded on FAO/ETAP Fellowship for studies in the general field of Marine Biology. She will stay for $4\frac{1}{2}$ months in U.K. and two weeks in West Germany. In U.K., she will study population dynamics and stock assessment of fish at the Lowestoft Laboratory after which she

will study new techniques to rear fish and invertebrates in marine aquaria, at Aberdeen, Scotland.

An FAO/ETAP fellowship has been awarded to Mr. S. Thyagarajan, Superintendent, Inshore Fishing Station, Rameswaram, South India. He will spend six months in European countries visiting fishermen's training establishments.

Training Centers

Fisheries Surveys Training Center for Africa

A Training Center on Fisheries Surveys for the countries in the African region being organized by FAO opened at Tanga, Tanganyika, on 9 November and ended on 18 December 1959. The Government of Tanganyika appointed Mr. G.J. Lockley, Fisheries Officer, Dar-es-Salaam, as Director of the Center. Professor J.A. Crutchfield of the University of Washington, Seattle, USA, was the FAO Associate Director. A number of FAO officers participated in both the theoretical and practical work of the center. These include Mr. William Beckman, an FAO fisheries biologist from headquarters staff; Mr. John L. Dibbs, an FAO marketing expert now on assignment in Ghana; Mr. A.G. Wurtz, an FAO expert on assignment as fisheries biologist in Uganda; and Mr. T. Yamamoto of the Ministry of Agriculture and Forestry of Japan and a former lecturer at the Indian Fisheries Statistics Training Center held earlier this year in Bombay. The Training Center was concerned with the objectives, methods and uses of surveys in all phases of fish production, processing and distribution. Apart from the lectures, the participants

at the Center went on field trips which illustrated the instructions given in the classroom. The special problems of the fisheries in the African Region were discussed in seminars. Participants at the Training Center came from all parts of Africa and included not only students from independent African countries but also from other territories and dependencies.

FAO Statistics Training Center in Copenhagen

Twenty government officials from 14 countries and territories (Ethiopia, Ghana, Greece, Iran, Lebanon, Liberia, Morocco, Nigeria, Pakistan, Turkey, U.K. overseas territories [Malta, N. and S. Rhodesia, Uganda], Yugoslavia) attended the International Training Center in Fishery Statistics, organized by FAO, and held in Copenhagen, Denmark, at the invitation of the Danish Government. The Training Center was particularly designed for those who are immediately responsible for the collection and collation of primary fishery statistics. Holding the Center in Copenhagen was especially advantageous because Denmark has a highly developed fishing industry and the Government Statistical Services are very well organized and efficient

thus providing excellent facilities for study. During five weeks, the participants attended lectures and demonstrations on organization, methods, practical application and evaluation of fishery statistics. Seminars were an important feature of the Center at which individual participants introduced and discussed reports on the present organization of fishery statistics in their own country, with special reference to improvements which could be effected in the light of information gathered at the Center. After two weeks in Copenhagen, the participants moved to Huthshels, a fishing port in North Jutland, where they took part in the collection of statistical data and also got an insight into fishing methods, catch, gear, etc. Denmark is particularly well suited for field work of this nature because the fishing industry is based on a large number of small, owner-operated craft, using a wide variety of fishing gear, based on widely scattered fishing ports of all sizes. The rapidly developing fisheries in the participating countries are facing problems of statistical design and management similar to those faced, and successfully solved, in Denmark over the last forty years.

IPFC AFFAIRS

Personnel: Mr. J.A. Tubb, Secretary, visited Burma, India and Pakistan on his way to Rome to attend the FAO Conference and took part in the discussions of the IPFC program of work.

Dr. G.N. Subba Rao, Technical Secretary, Technical Committee II, attended the 5th Session of the ECAFE Inland Waterways Sub-Committee, during

4-16 November 1959, at Bangkok as an Observer. Some topics of common interest such as stationary fishing installations in the waterways as well as clearance of aquatic vegetation were discussed.

Executive Committee Meeting: The 29th Meeting of the IPFC Executive Committee took place at Hong Kong

during 5-8 October 1959. The meeting was attended by Mr. Tran Van Tri (Viet Nam), Chairman; Mr. D.T.E.A. de Fonseka (Ceylon), Vice Chairman; Mr. Soong Min Kong (Malaya), Chairman of Technical Committee I, and Mr. J.A. Tubb, Secretary. Dr. K. Kuronuma was unable to attend the meeting due to ill health. The meeting reviewed the progress made since the Eighth Session of the Council which was held at Colombo, Ceylon.

FAO Conference: The FAO Conference approved the Secretary's report on the IPFC and its program of work and endorsed the Council's program of work for 1960/61 subject to availability of funds.

Technical Committees' Activities: The Technical Secretary, Technical Committee II, Panels A and B issued the following circulars to members of the Technical Committee: (1) A circular dated 13 August requesting information for the *Current Affairs Bulletin*; (2) A circular dated 2 September to members

of Panel B repeating the request for information on boiled fish; (3) A copy of ExCo/WP5, Interim Report of the Technical Secretary, Technical Committee II; (4) A circular to members of Panel A dated 15 September enclosing a set of papers of Symposium on "Improved Types of Fishing from Small Mechanized Boats"; (5) A circular to members of Panel B, dated 3 November describing the progress made on the preparation of *Report on Boiled Fish* as well as collection of information for the *Fishery Products Manual*.

The Technical Secretary, Panel C issued a circular to the Panel members requesting information for an Outline for A Review of Fish Transport Organization and Facilities in selected Fishing Centers of the Indo-Pacific Region.

Documents: Two Occasional Papers have been issued:

- 59/10 — The Philippines Measuring Board
- 59/11 — The Use of Pituitary Hormones in Fish Culture

EVER HEARD OF A FISH THAT CAN'T SWIM ?

Such a fish, if it can rightfully be called one, has been discovered by scientists at the Scripps Institution of Oceanography.

As yet unidentified, the rare little species hops about on the ocean floor instead of splashing about as a fish is supposed to.

It was during a recent expedition to the Gulf of Tehuantepec in Mexico that this strange creature was hauled up in a dredge from a depth of about 3,000 feet.

The scientists say it props itself up on its pectoral and pelvic fins and propels itself along the bottom of the ocean by crawling and hopping.

Richard H. Rosenglatt, curator of fishes at Scripps, explained that the "fish" although adapted to life at great depths, is related to similar finny creatures found in shallower water. He said it is also similar to deep sea batfishes collected by Alexander Agassiz Off Central America. (*Singapore Tiger Standard*, 24 July 1959).

PERSONALIA

Dr. Katsuzo Kuronuma is reported to have resigned from his position as Chief, Freshwater Fisheries Research Laboratory Hinomachi, Tokyo, Japan. Dr. Kuronuma has been intimately associated with the IPFC since 1952 when he was the member of the IPFC Technical Committee II. He has also been the Chairman of the Council since 1957 including the 8th Session held at Colombo, Ceylon, during 6-22 December 1958.

Dr. Kuronuma's future plans are not known.

It is learnt that **U Baw Kyaw**, Executive Officer, Division of Fisheries, Land and

Rural Development Corporation, Burma has retired. He has been associated with IPFC activities for several years. He is succeeded by **U Tint Hlaing**.

Dr. Shelbourne, Acting Director, Fish Culture Research Institute, Batu Berendam, Malacca, is succeeded by **Dr. G.A. Prowse**, Research Officer, who has taken over as Director.

Dr. Y. Tripathi, formerly Research Officer at the Central Inland Fisheries Station, Calcutta, has been transferred as Research Officer, Lacustrine Unit of the Central Inland Fisheries Research Station, Tungabhadra Dam, South India.

CURRENT READING

Fisheries Statistics of Thailand 1958.

This publication has been compiled by the Statistics Section, Ministry of Agriculture, Thailand. The contents are as follows:

A brief account of the techniques of collection of statistics and data compilation and analysis are given. In the Section dealing with the production there are 8 tables giving annual fish catch of Thailand from 1952-58, utilization of fish products, production from various fishing grounds, etc. The Section on Commerce gives data on the various types of fresh water fish, inland fish and processed fish marketed.

The chapter on Fish ponds gives an account of the fish fry distribution and number and area of fish ponds by geographical zones. Exports and imports

of fishery products are described in the section on Foreign Trade. Data including number of registered Thai fishing boats as well as fish catching method are also given.

C.J. Bottemanne. Principles of Fisheries Development (North-Holland Publishing Company, Amsterdam, Netherlands), 1959, 677 pages, in English. This book is divided into 5 parts, 17 chapters. The difference chapter headings are as follows:

Part I. Basic Facts

Chapter 1 – General Introductory Points

Chapter 2 – Fish Populations

Part II. Principles of Fishing

Chapter 3 – Fishing Methods

- Chapter 4 – Fishing Units
- Chapter 5 – Use of Resource

Part III. Main Features of Dynamic Fisheries

- Chapter 6 – Expansions in Fisheries Proper
- Chapter 7 – Role of Complementary Industries
- Chapter 8 – Structural Problems of Fisheries

Part IV. General Principles of Development

- Chapter 9 – Pattern of Structure
- Chapter 10 – Development and Leverage
- Chapter 11 – Climates for Development
- Chapter 12 – Development Strategy

Part V. Problems of Development in Fisheries

- Chapter 13 – Conditioning Factors in Development
- Chapter 14 – Basic Leverage Patterns
- Chapter 15 – Development of Fishing Units
- Chapter 16 – Method and Instrument of Leverage.

Each chapter is followed by copious notes.

There is a Bibliography of some 266 references including Annual Publications, Periodicals, Books and Articles. At the end there is an alphabetical index.

Annual Report of the Directorate of Fisheries, East Pakistan, for the Year Ending March 31, 1957, 151 pp., illus., printed. East Pakistan Government Press, Dacca, East Pakistan, 1958.

Describes the work of the Directorate of Fisheries during 1956/57. Contains, among others, sections on Administration of the Protection and Conservation of Fish Act, 1950; production and development of fish farms, reclamation of derelict water areas, nursery fish farms, introduction of exotic fish, and research on control of aquatic vegetation; and shrimp culture. Short-term projects were approved for transport of fish in the district of Sylhet, mechanization of fishing vessels, expansion of net factory, "grow more fish" campaign, and procurement of fishing supplies for needy fishermen. The report also presents statistical tables covering quantities of fish exported, processed, and transported by species and districts; average wholesale and retail prices for various species and types of fish; and number of fishermen and vessels in relation to quantity of fish landed in various districts.

Report of the Technical Meeting on Costs and Earnings of Fishing Enterprises, 8-13 September 1958, London. Published by FAO. 161 pp. in English.

Sir Louis Chick, K.B.E., Chairman, White Fish Authority (United Kingdom), in his opening remarks as General Chairman of the Technical Meeting on Costs and Earnings of Fishing Enterprises which was held in London in September 1958, stated "If this meeting does nothing more than to stimulate in management as well as in government and public agencies a wider interest in costs and

earnings studies as a means of improving the efficiency of the industry then for this alone we shall be entitled to count the meeting a success". A report of that meeting has now been published by FAO. The meeting was attended by 52 experts from 21 countries. The report presents a wide range of information on costs and earnings in the fishing industry, containing excerpts from the papers submitted and from the remarks of the rapporteurs, as well as a summary of the discussion.

The discussions revealed, in particular, the need to investigate and study the costs and earnings in the fishing industry. As the report states: "One of the principal virtues of the discussions was that they succeeded in bringing to the fore what type of cost and earnings information was wanted, in what form it was wanted, who wanted it and why he wanted it. On the answers to these questions, participants agreed, depended the nature of the inquiry to be undertaken in each instance, the methods of organization and conduct, and the analysis of results. While studies of a broad scope were satisfactory from the standpoint of indicating certain trends and furnishing guidelines for future policies, reliable answers relating to the contributions of individual factors to the success of operations could be obtained only on the basis of inquiries specifically tailored for these purposes. In this connection, the danger of drawing specific conclusions from a body of data on operations which had not been sufficiently stratified was clearly recognized. Conversely, it was concluded, one had to guard against ascribing general significance to observations made in the course of individual inquiries. Thus, for instance, it was shown that the positive correlation

between size and earnings mentioned in some of the papers as well as in the discussions did not apply in so-called over-capitalized' fisheries. Here, high, capital charges on large craft, some of which had been added to the fleet only at a relatively recent date, accounted for the fact that smaller operations showed more favorable results."

The relationship between size of fishing vessel and earnings was a special feature of the discussions. There was also, the report goes on to say, evidence of considerable conflict in views regarding the relative importance of technological factors and the human element in determining successful operation in fisheries.

The report lists seven points on which there was substantial agreement among participants: (1) Efforts should be made to ensure the cooperation of biologists, administrators, technologists, economists, and other specialists in the organization of studies and in the analysis of results. (2) If industry expects to obtain certain benefits from government, it must be prepared to lend government its cooperation in cost and earning studies. In turn, government researchers will increase the practical value of their investigations if they maintain close liaison with the fishermen in the preparatory phase, and throughout the conduct, of their studies. Industry should take a greater interest in sponsoring research on its own. (3) The present state of knowledge does not permit specific price forecasts in the fisheries. In some fisheries and under certain conditions, however, it was stressed, forecasts of a limited nature were possible. (4) In the analysis of operational results one must not stop with computation of certain mathematical correlations. There is a need to demon-

strate implications from a practical standpoint. (5) Conclusions regarding industry performance drawn on the basis of cost and earnings evidence alone, and without reference to other factors, could be misleading. To construct the proper frame of reference, policies pursued by the government and institutional factors, among other things, had to be considered. One of the Polish contributions indicated, for instance, that in Poland cost and earnings information was not the only guide in the shaping of development policies. (6) Participants without exception were in favor of a greater international exchange of experience. One of the first requisites in this connection, they thought, was the translation of reports on completed studies into one or more of the official languages of

FAO. (7) FAO, further, participants felt, could actively assist by organizing a study on classifications and definitions used in cost and earnings studies. They, therefore, adopted a formal resolution requesting FAO to consider the feasibility of including a project along these lines (to be carried out with the cooperation of experts from the various countries interested in the problem) in its program.

Included in the report are 29 tables dealing with various aspects of costs and earnings studies in Canada, Japan, Netherlands, Poland and Sweden and three graphs dealing with factors affecting the success or failure of British fishing vessels.

The report is available free of charge on application to FAO, Rome.

MEETINGS AND CONFERENCES

World Sardine Meeting

World Scientific Meeting on the Biology of Sardines and Related Species was convened by FAO at its Rome headquarters, and was attended by more than 50 experts from 26 countries. Some 60 scientific papers were presented. The objectives of the meeting were to appraise the status of knowledge on the biology of sardines, assess present methods of research and indicate "the lines along which national and international action might be developed" to improve research programs. The papers, discussions and conclusions of the meeting are to be published in book form.

Since various species of sardines are found in most of the oceans of the world, the complexities of fisheries research methods require more coopera-

tion and coordination between the nations of the world fishing sardines. Even though the differences in behavior and environment make it difficult to examine geographically widely separate groups of sardines, there are many problems of the research program which make cooperation on an international scale essential or highly desirable. Where closely related stocks are being studied by different countries, cooperation may be extended beyond methodology and might even be applied to such projects as understanding the environment in a spawning area or adjacent spawning areas, etc.

It is quite apparent that widespread changes in hydrographic conditions occur at times. They have a profound effect on fishes. In order to develop hypotheses as

to the effect of these environmental factors on abundance and accessibility, a method must be found for the free and rapid exchange of information and data.

The meeting therefore made the following nine recommendations:

1. FAO compile and publish as soon as possible, as a supplement to the proceedings of the meeting, a comprehensive annotated bibliography on sardine research up to 1959.
2. A directory of sardine research institutions, specialties of their personnel, pertinent major facilities available and the types of research in which they are engaged, be periodically published by FAO.
3. Follow-up meetings on the biology of sardines, or preferably on particular aspects of sardine research, be held within the next five years under FAO's sponsorship. With this end in view, consultative groups such as the one which helped initiate the first world meeting should be constituted.
4. Similar meetings should be organized on other species for which major fisheries exist.
5. FAO should continue its endeavors towards the standardization of routine methods used in various national or regional research programs.
6. In view of the increasing need for the pooling of length frequency data on a regional and/or comparative basis, which makes standardization of measurement and their tabulation highly desirable, "standard length" should

be adopted as a *reference dimension*. *Conversion factors* of the length dimensions routinely used by the workers from each institution should be submitted to the Secretary of the Meeting for inclusion in the published proceedings.

7. FAO should energetically proceed with its program for the accumulation and publication of data on each species of sardine, in the pattern of the species synopses used for the purposes of the meeting.
8. Countries engaged in research on sardines should take note of the great value of the exchange of scientists or teams of scientists to take advantage or special techniques and skills developed in the widely-separated institutions.
9. Specialized researches on sardines should be improved, for mutual benefit of countries interested in a common fishery or in the same type of fishery, by international organizations or research foundations providing funds so that workers from several countries may participate in current studies at laboratories that are especially active and competent in particular fields of research.

Use of Atomic By-products in Preserving Foods

Studies on the treatment of some foodstuffs with relatively low dosages of ionizing radiations have advanced in Europe to a point where some practical applications of the method may be developed in the reasonably near future provided that the wholesomeness of the treated food has been assured.

A report completed by FAO says, in guarded and qualified language, that impressive progress has been made in the past few years in laboratory use of radiations in extending the storage life of foods and in killing undesirable organism in food.

The report is a summary of the European meeting on the use of ionizing radiations for food preservation, held in November 1958 at the United Kingdom Atomic Energy Authority's Atomic Energy Research Establishment at Harwell. It was attended by 176 representatives of 17 European members of FAO, and by 22 observers from five non-European members, and 14 international organizations.

On the basis of review papers presented by invited specialists from European countries and the United States, the meeting surveyed the present status of food irradiation, evaluated the technique's potential for European countries, and considered the need for and possibilities of organizing international cooperation in research.

The report warns that many basic problems remain to be solved before radiation treatment of foods for the extension of their storage life will be ready for widespread development and application. But, it points out, "a few possible applications of irradiation, such as the inactivation of *Salmonella* in egg products and of certain parasites in meat, the disinfestation of grain and certain packaged products, and the suppression of sprouting in potatoes and root crops, are approaching the stage at which commercial exploitation might be considered, provided that the wholesomeness of the treated foods had been assured".

Food irradiation was still in the stage of laboratory research in Europe

but plans under way in the United States for pilot and demonstration plants "reflect confidence in the process".

Present indications were that treatments involving the use of substerilizing doses of radiation, rather than the higher sterilizing doses, were "more likely to lead to practical applications in the reasonably near future".

Treatment with moderate doses had produced a five-fold increase in the storage life of certain meats and meat products, fish and some fruits and vegetables. The food poisoning organism *Salmonella*, frequently found in egg products, had been successfully killed in frozen whole egg pulp. The irradiation process, the report says, performs its work without appreciably raising the temperature and thereby cooking foods, and the product need not be removed from its package.

Treatment with higher doses, intended to give a sterile food in which no microbial spoilage is possible, produced changes in color, flavor, odor and texture which were considered objectionable. This problem would have to be solved before such treatments were likely to be used on a wide scale.

The meeting agreed that the potential value of food irradiation as a method of preservation "justified considerable investment in research". It recommended that European governments encourage and support such research, and that appropriate forms of international cooperation in this research be established to reduce its cost. It asked that FAO establish a permanent technical working group on food irradiation to review developments in the field, and that the Organization set up such other technical groups as will be necessary to study the problem of formulating fundamental

principles governing the use of irradiation and methods of testing irradiated foods for wholesomeness; the aim would be to evolve a common basis for legislation on the subject in individual countries, and other such technical groups might be formed to study microbiological and entomological aspects of food irradiation.

International Standards for Chemical Additives to Food Proposed

A joint committee of the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) has made a move towards identifying and establishing standards of purity on an international basis for commonly-used chemicals which are added to many foods.

The Joint FAO/WHO Expert Committee on Food Additives which met in Rome in December has begun to draw up provisional specifications for a number of the more important food additives, with special reference to antimicrobial preservatives (used in fruit juices, jams, etc.) and antioxidants (used for stabilization of fats and oils). Earlier meetings of the joint committee had agreed that food

additives should be identifiable, and that established specifications of purity were the best means of excluding harmful impurities from food additives.

At the December meeting, delegates stated that specifications or standards of purity have been established for only a small portion of the increasing number of chemical substances which are currently added to the world's food supply.

Substances added to foods, it was pointed out, are used for a variety of purposes, among them the preservation, flavoring, and coloration of foodstuffs. The joint meeting said that the identity and concentration of major components of a food additive must be known in order to carry out an effective investigation of its properties. It drew up provisional specifications for two major groups of the most commonly-used food additives, that is the antimicrobials and the anti-oxidants. These specifications include the chemical name and popular synonym of each substance, its description and chemical or structural formula, the percentage of each component, proposed identification tests, and acceptable standards of purity.

FORTHCOMING CONFERENCES, MEETINGS AND TRAINING CENTERS

Date	Subject of Conference	Convening Body and/or Organizers	Location
1960			
March	4th Session of the ECA Sub-Commission on Extension and Vocational Training in Agriculture, Home Economics and Rural Youth	RU/NU	Yugoslavia
April 25-30	European Inland Fisheries Advisory Commission	FI	Dublin
Sept/Oct ?	FAO Council - 34th Session	PR	Rome
October	General Fisheries Council for the Mediterranean, 6th Meeting	Mr. M.J. Girard Regional Officer for Europe and Near East	-
November	5th FAO Regional Conference for Asia and Far East	ODG	Vietnam
Spring ?	Program Committee - 4th Session	PBS	Rome
Spring ?	Finance Committee - 4th Session	ADMIN	Rome
Second Quarter	FAO/ECE Meeting on Food Consumption Surveys	ST/NU	Rome
Last Quarter	Indo-Pacific Fisheries Council, 9th Session	FI	-
Undet	Technical Meeting on Credit and Subsidy Schemes in the Fishing Industry	FI	-

FAO TRAINING CENTERS AND SEMINARS

1960

1 Feb.- 12 March	Latin American Inland Fisheries Training Center (ETAP)	FI	Buga Colombia
1 Sept.- 13 Oct.	Training Center on Fishing Methods and Gear (ETAP)	FI	Suez Egypt
Undet	Meeting on Food Consumption Surveys with ECAFE and Conference of Asian Statisticians	ST	Bangkok

1961

January	FAO/IPFC Training Center on Fish Processing in Humid Tropics	FI	Manila (?)
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IMPORTANT IPFC PUBLICATIONS

PROCEEDINGS (Records of Council Sessions.)

*First Meeting, Singapore, 24 - 31 March 1949

Section I :	Report of Proceedings
Section II :	Working Papers
Section III :	Contributed Papers
Section IV :	Symposium Papers

Second Meeting, Cronulla, N.S.W., Australia, 17 - 28 April 1950

Section I :	Report of Proceedings
Section II :	Technical Papers
Section III :	Symposium Papers

Third Meeting, Madras, India, 1-16 February 1951

Section I :	Report of Proceedings
*Section II :	Technical Papers
*Section III :	Symposium Papers

Fourth Meeting, Quezon City, Philippines, 23 October - 7 November 1952

Section I :	Report of Proceedings
Section II :	Technical Papers and Symposium Papers

Fifth Meeting, Bangkok, Thailand, 22 January - 5 February 1954

Section I :	Report of Proceedings
*Section II :	Technical Papers
Section III :	Symposium Papers

Sixth Session, Tokyo, Japan, 30 September - 14 October 1955

Section I :	Report of Proceedings
Section II :	Technical Papers
Section III :	Symposium Papers

Seventh Session, Bandung, Indonesia, 13 - 27 May 1957

Section I :	Report of Proceedings
Section II :	Technical Papers
Section III :	Symposium Papers

Eight Session, Colombo, Ceylon, 6 - 22 December 1958

Section I :	Report of Proceedings (in Press)
Section II :	Technical Papers (in Press)
Section III :	Symposium Papers (in Press)

(* Items so marked are out of print.)

CURRENT AFFAIRS BULLETIN (Quarterly)

No. 1-26, July 1951 - December 1959 (* 1-21, 23)

SPECIAL PUBLICATIONS (Irregular)

- *No. 1: Schuster, W.H. (1952). Fish Culture in Brackish-water Ponds of Java. 143 pp.
- *No. 2: Anonymous, (1952). Fish Culture in Indonesia. 126 pp.
- No. 3: Zaneveld, J.S. (1955). Economic Marine Algae of Tropical South and East Asia and their Utilization. 55 pp.
- No. 4: Anonymous, (1958). Annotated Bibliography on Fishing Gear and Methods.

MISCELLANEOUS

Directory of Fisheries Institutions—Asia and the Far East.

1959 OCCASIONAL PAPERS (Irregular, Mimeo)

- *No. 59/1 A List of Commercial Fishes of Indonesia, by Mohd. Unar and M. Sachlan.
- *No. 59/2 The Bank of Fishermen's Cooperatives, by Eddiwan.
- No. 59/3 Synopsis of Biological Data on Milkfish *Chanos chanos* (Forsk.) 1775, by W.H. Schuster.
- No. 59/4 A List of Lake Plankton-Burma, by J.A. Tubb.
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(* Items so marked are out of print.)